

ANALYSIS OF STATE APPROPRIATIONS TO HIGHER EDUCATION:  
FLORIDA AND TEXAS

A Dissertation

by

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## ABSTRACT

This study was a quantitative examination of the equity of state appropriations allocated to public higher education institutions in Florida and Texas through state appropriations. This study was actively directed toward the formation and implications of public policy based on historical research and data. The study examined equity based on fiscal and institution level information from the academic years of 1993-1994 to 2007-2008; 15 years subsequent to the holding of *U.S. v Fordice* and the Office for Civil Rights regulatory requirements issued to states to improve equity in their public systems of higher education.

This study performed a dispersion analysis of fiscal equity using, two common inequality measures, the Theil's T statistic and Gini Coefficient. A secondary analysis was performed using multiple linear regression to analyze the relationship between allocated state appropriations to an institution and variable institutional level characteristics.

The results of this study indicated that the overall equity of higher education appropriations to state institutions in Florida and Texas had improved during the 15 years subsequent to the Office for Civil Rights regulatory requirements stemming from *U.S. v. Fordice*. Additionally, the data demonstrates there are definite state priorities present within the respective funding models that may influence the level of state appropriations distributed to individual institutions. In both Florida and Texas, funding models favored the premier research institutions within the state. Coupled with

enrollment, as certain institutions academic characteristics increased, so did their appropriations per FTE.

This study demonstrated that Florida and Texas have made strides in increasing the equity of state appropriations in their state systems of higher education. Even if all funding is not equal, the data indicates equitable funding processes comprising legitimate educational rationale in which state appropriations are distributed. However, even though greater parity between educational institutions may be present, a core issue involved the equitable access to academic quality for all students within the state as well, and more progress stills need to be made in that regards.

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## TABLE OF CONTENTS

	Page
ABSTRACT .....	ii
ACKNOWLEDGEMENTS .....	iv
TABLE OF CONTENTS .....	v
LIST OF FIGURES .....	vii
LIST OF TABLES .....	viii
CHAPTER I INTRODUCTION.....	1
Problem Statement .....	4
Purpose of the Study .....	7
Research Questions .....	7
Significance of the Study .....	8
Methodology .....	9
Organization of the Dissertation.....	10
Definition of Terms .....	11
CHAPTER II REVIEW OF THE LITERATURE.....	14
Implications of Access and Choice .....	14
Cost of Higher Education .....	18
Investment in Higher Education: Public vs. Private Good.....	24
Role of State Appropriations .....	26
External Influences on State Appropriations .....	28
Competing Budgetary Interests .....	32
Trends in Resource Allocation .....	34
Allocation of State Appropriations.....	37
Theoretical Framework .....	48
CHAPTER III METHODOLOGY.....	56
Research Design .....	56
Data Analysis –Status of Fiscal Equity within the States .....	60

	Page
Data Analysis –Relationship of Fiscal Equity to Institution-level Characteristics .....	64
Limitations and Trustworthiness .....	72
CHAPTER IV ANALYSIS OF DATA .....	74
Research Question #1 .....	75
Research Question #2.....	89
Summary of Results .....	100
CHAPTER V CONCLUSION .....	101
Brief Overview of the Study .....	101
Analysis and Discussion.....	103
Implications of the Findings.....	112
Recommendations for Future Research .....	115
Final Thoughts.....	116
REFERENCES .....	119

## LIST OF FIGURES

FIGURE	Page
1 Florida: Trend Analysis of Theil's T Statistic (AY 93-94 through AY 07-08).....	76
2 Florida: Largest Positive/Negative Contributions to Theil's T Statistic ....	78
3 Texas: Trend Analysis of Theil's T Statistic (AY 93-94 through AY 07-08).....	79
4 Texas: Largest Positive/Negative Contributions to Theil's T Statistic .....	80
5 Florida & Texas: Analysis of Theil's T Statistic (AY 93-94 through AY07-08).....	82
6 Florida: Trend Analysis of Gini Coefficient (AY 93-94 through AY 07-08).....	85
7 Texas: Trend Analysis of Gini Coefficient (AY 93-94 through AY 07-08).....	86
8 Florida & Texas: Trend Analysis of Gini Coefficient (AY 93-94 through AY 07-08).....	87

## LIST OF TABLES

TABLE	Page
1 Variables for Multiple Linear Regression Analysis .....	65
2 Florida & Texas: % Change in Theil Statistic (AY 93-93 through AY 07-08) .....	83
3 Florida & Texas: % Change in Gini Statistic (AY 93-93 through AY 07-08) .....	89
4 Florida: Multiple Regression Results (Full Model) .....	92
5 Florida: Multiple Regression Results (Stepwise Model) .....	93
6 Texas: Multiple Regression Results (Full Model) .....	97
7 Texas: Multiple Regression Results (Stepwise Model) .....	98
8 Florida: Analysis of Institutional Characteristics .....	107
9 Texas: Analysis of Institutional Characteristics .....	108



## CHAPTER I

### INTRODUCTION

The attainment of educational equity has been a central goal of American higher education and a centerpiece of educational research and reform (Hurtado, Inkelas, Briggs, & Rhee, 1997). In particular, financial equity is a significant issue related to the success and legitimacy of our educational system (Brady, 2001). An important factor in determining the extent to which institutions can achieve their desired educational outcomes is the financial resources of the institutions. The 2012 edition of *Policy Matters*, a higher education policy brief produced by the American Association of State Colleges and Universities (AASCU) listed the state's funding of higher education as the most critical policy issue most likely to affect public higher education for the fourth consecutive year. The allocation of financial resources to higher education institutions impacts college affordability, enrollment capacity and academic quality of higher education (AASCU, 2012).

Over the past few decades, state legislatures have responded to economic, demographic, and political pressures by adjusting the amounts of funding to higher education (McLendon, Mokher, & Doyle, 2009). A rise in the burden on tax revenues and structural deficits have continued to appear in many state budgets as a result of increased state funding in such areas as the criminal justice system, K-12 education, and health care (Ehrenberg, 2005). With states' facing decreasing resources, competing priorities, and the public's resistance to increasing state taxation, state legislators are in

the position of considering the relative importance of state services, including the financial resource allocation to higher education (Cheslock & Gianneschi, 2008).

Higher education is typically a discretionary budget item in most states, which has often resulted in a lessened priority in the allocation of state funding (Cheslock & Gianneschi, 2008). Legislators view higher education as discretionary due to the perspective that institutions can attract and have alternate sources of revenue production such as tuition, fees, and endowments (Rizzo, 2004). The effect of such perspectives on alternative sources of funding are state legislators allocating decreasing shares of their financial resources towards the funding of higher education. However, Rizzo (2004) argues that the revenue shortages to higher education from state budget cuts will most certainly have negative effects on college accessibility and on the behavior of higher education institutions. Research indicates that variation does exist in the level of the institutional funding provided for higher education (Tandberg, 2008). Thus, with the decreased amount of financial resources being allocated to higher education, the financial equity of those resources has become even more important.

Leslie and Heubert (1988) argued that institutional finances are of educational significance because money is a fundamental resource for providing programs and services. The human and logistical needs to have educational success cannot be met without financial resources. Leslie and Heubert (1988) suggest that equity in funding is a necessary condition for educational opportunity. However, financial resources alone do not guarantee educational equity, but without financial resources, educational equity cannot be achieved. In this research study, equity refers to financial resource

availability, with all other factors being more or less equal. Financial equity is significant in and of itself, as it would be inequitable to provide a certain institution fewer resources than another without a legitimate, non-arbitrary, unbiased, and education-based rationale or determinant for such allocations.

This research study conceptualized equity in financial resource allocation based on the established scholarship and metrics of education finance (Berne & Stiefel, 1984; DesJardins, 2002; McLendon et al, 2009). Thus, at its premise, equitable financial resource allocation should promote strategies that are based on horizontal equity principles that provide equal shares to those with equal needs (Dowd & Grant, 2007). However, financial resource allocation does not have to be an exact equal appropriation to each institution, but rather the unbiased and non-arbitrary distribution of financial resources to institutions providing an impartial and proportionate share of the financial resources available (Noe, 1986).

Leslie and Heubert (1988) argued that if resource allocations are equitable, then we should not be able to identify higher education institutions' demographics merely by an examination of their budgets, financial aid allocation, or state appropriations. If inequities are present in institutional funding and financial resources, then it is important to analyze the basis of such allocation. Therefore, the basis of financial resources allocation should not be arbitrary or biased, but based on a rational and legitimate education-based principles and policy. This examination of financial resource allocation provides beneficial information that further addresses the financial equity of our public higher education system.

### Problem Statement

This focus on equity is not a new development; concerns over aspects of educational equity have been present for decades. Originally, the Fourteenth Amendment of the U.S. Constitution permitted state imposed racial segregation as long as the state provided non-white students considerably equal opportunities for education on the level of white students. From 1938 to 1950, the U.S. Supreme Court reviewed cases that challenged the concept of whether the racially segregated educational institutions were equal in providing a quality education to their students. Although quality has many areas of focus, in every case, there was some aspect of financial resource comparison used as evidence to support this notion (Leslie & Huebert, 1988).

As indicated by the United States Supreme Court opinions, past or present funding disparities between institutions can be an indication of discrimination. The United States Supreme Court case *United States v. Fordice* (505 U.S. 717, 1992) set the standard from which the Office for Civil Rights, a component of the U.S. Department of Education, determined that equity disparities, including that of financial resources, were found to be present at the historically black colleges and universities within several states. The Office for Civil Rights, based on the *Fordice* decision, reaffirmed that all states with a history of *de jure*, meaning by law, segregated systems of higher education have an affirmative duty under the Equal Protection Clause of the Fourteenth Amendment to the Constitution, and Title VI, to dismantle such higher education systems (Cantu, 1994).

States must implement measures to assure that no evidence of de jure systems of segregation remain present and continue to produce discriminatory effects upon higher education institutions. The Office for Civil Rights, examines a wide range of factors, set out in *Fordice*, in making this determination that systems of segregation have been discontinued and a state system's distribution of financial resources for its higher educational institutions is one of the factors examined (Cantu, 1994). Thus, where states have shown to have had prior systems of racially dual systems of public higher education, these states must discontinue such system and eliminate all present inequities that arose as product of state imposed segregation.

OCR applied this *Fordice* standard to all states with pending Title VI evaluations of their respective higher education systems and that had no currently OCR-accepted plans that explained the states process of remedying their de jure systems of segregation (Cantu, 1994). The states for which this standard applied to were Florida, Kentucky, Maryland, Pennsylvania, Texas, and Virginia. Two of these states whose process of eliminating de jure systems of segregation was under review by the OCR, Florida and Texas, are the basis for this study.

However, this study sought to broaden the examination and assess the status of equity of financial resources, not just at the historically black colleges and universities, but across all the public higher education institutions within Florida and Texas after the *Fordice* decision and the OCR mandate to remedy equity disparities was brought forth. By selecting two states rather than one state for this research, a greater level of data was

utilized and provided a more extensive level of depth to the study, as well the ability to compare and contrast state-specific data.

Florida and Texas were selected based on their demographical, cultural, and educational similarity and applicableness to the research. Florida and Texas are the two most populous states of the six states under review having respective populations of 19.1 and 25.7 million residents as of the latest 2010 Census data. Florida and Texas are similar in their residents' educational background and level of attainment as 26% and 24.5% of their respective residents hold a bachelor's degree with the national state average being 27%. From the perspective of demographics, Florida and Texas are both similar in their higher levels of ethnic diversity. Florida has a 16% African-American and 23% Hispanic/Latino population. Texas has a 12% African-American population and 38% Hispanic/Latino population.

Along with having similar demographic and cultural characteristics, Florida and Texas have a larger number of higher education institutions from which to provide a larger sample of data for this research. With both of these states being in the southern region of the United States, they are also within the membership of the Commission on Colleges of the Southern Association for Schools and Colleges educational accrediting body (SACS-COC). Therefore, these states' institutions are similar in the educational and governing policies and regulations in which they must abide and adhere to under SACS-COC. In this respect, Florida and Texas have similar educational and political cultures that are giving rise to calls for increased accountability in education, with an

emphasis in regards to student performance, educational quality, and institutional effectiveness and efficiency.

### Purpose of the Study

This study examines the equity of states' resource allocation to institutions within these states. According to McKeown (1996), issues of equity are not often addressed nor are the focus of the research in higher education finance. The limited scope of research that has been done on financial resource equity in higher education has related primarily to financial aid (Orfield, 1992; Brady, 2001). This study examined institutional funding in an effort to address gaps in our understanding of how institutional funding and resource allocation impact the equity of higher educational institutions.

### Research Questions

This study examines the extent of progress in achieving greater equity of financial resources provided to public higher education institutions over a 15-year span after the *Fordice* decision and OCR mandates in Florida and Texas. These two states were identified by the Office for Civil Rights as having past funding disparities in their state's higher education system.

The following research questions guided this study:

1. To what extent does the inequality in state appropriations allocated to public higher education institutions in Florida and Texas change over the 15-year span from 1993 to 2007?

2. To what extent do institution-level characteristics explain the variance in state appropriations allocated to public higher education institutions in Florida and Texas during the 15-year span from 1993 to 2007?

### Significance of the Study

Public higher education is a significant state investment and the resources allocated to public higher education impact the degree of quality the institutions can provide (Tandberg, 2008). Thus, it is critical for policymakers to understand the levels of equity within their funding models for public higher education. There is a lack of research at the tertiary level on the equity of financial resources and the resource allocation methods of the states, thus an increased knowledge on the current equity of funding would permit policymakers to estimate the impact of funding disparities on their state's higher education system.

Lowry (2007) suggests that more research and attention should be focused on public higher education:

Scholars of state politics and policy have devoted very little attention to the public universities where so many of them work. This seems odd, as public higher education is organized at the state level, and funding and governance of public universities have been prominent subjects of debate in many states in recent years. Government appropriations have been declining as a share of public university revenues, and many states have revised or considered revising their institutions for governing public higher education . . . . Moreover, issues



surrounding public universities provide many opportunities for research that can shed light on a broad range of questions (p. 2).

This study provides a greater understanding of the equity of funding models and explaining determinants of resource allocation to public higher education institutions. Examining what factors influence resource allocation and the variance between institutional funding are important issues for policy research. The actions and choices of the state's allocation of resources greatly affect public higher education institutions. These funds are used to make key decisions such as faculty hiring, enrollment sustainability, quality of services, and influence research capabilities (Bradford, 2008; Volk, Slaughter & Thomas, 2001).

Institutional resources are also of significance due to money being a principle instrument of public policy. This study aims to inform and enhance the discourse on the allocation of funding across a state's institutions since such financial decisions have shown to have implications on student access and the success of the institutions educational mission (Frenette, 2004). Central figures in the state resource allocation process should find the information provided beneficial in shaping policy and examining the equity of their funding models.

### Methodology

This study is a quantitative examination of the equity of state appropriations to higher education institutions in Florida and Texas. The study examined equity based on fiscal and institution level information from the academic years of 1993-1994 to 2007-2008; 15 years subsequent to the holding of *U.S. v Fordice* and the Office for Civil

Rights regulatory requirements issued to Florida and Texas to improve equity in their public systems of higher education. The quantitative history approach is actively directed toward public policy formation and implications (Brady, 2001).

Multiple statistical analyses were administered to permit a more extensive examination and interpretation. This study performed a dispersion analysis of fiscal equity using the Theil's T statistic and Gini Coefficient, two inequality measures commonly used in education finance research (Hale, 2008). A secondary analysis was performed using multiple linear regression to analyze the relationship between allocated state appropriations to an institution and institution-level characteristics. Each statistical analysis will be outlined in greater depth in Chapter 3.

The units of analysis for this study were the public higher education institutions in the two states of Florida and Texas. The primary source of data used to collect historical financial and institution-level information was the Integrated Postsecondary Education Data System (IPEDS). Additional institutional data not available from IPEDS were collected from the State University System of Florida Board of Governors and from the Texas Higher Education Coordinating Board. The study's research design, population, sources of data, data analysis, among others, is extensively discussed later in chapter 3.

### Organization of the Dissertation

Chapter 1 provides an introductory overview of the basis of this study, the problem statement, the purpose and significance of the study, as well as details the research questions that guide this study. Also, key terms such as equity, revenue, and

formula funding are defined and situated within the context of this study. Chapter 2 presents a review of literature pertinent to 1) equity and access in resource allocation, 2) the role of state appropriations, and 3) the allocation of state appropriations in higher education. Also included in Chapter 2 is a review of the theoretical framework of this study.

Chapter 3 then outlines the methodology utilized in this study. Accordingly, Chapter 3 addresses the research design, data sources and population, method of data analysis, as well as the limitations and trustworthiness of the study. Chapter 4 provides an explanation of the findings from the data analysis. Chapter 5 includes a brief overview of the study, its respective findings, and conclusions derived from an analysis of findings. Following the conclusion of the findings, implications and recommendations for future research are provided.

### Definition of Terms

The operational definitions of these terms come from a review of the literature and research. Within the context of this study, the terms are defined as:

*Carnegie Classification:* A classification framework to represent and control for institutional differences. System was designed for research purposes and used to ensure representative sampling of institutions, students, and faculty.

*Equity:* The unbiased and non-arbitrary distribution of financial resources to institutions providing a impartial and proportionate share of the financial resources available

*Full-Time Equivalent Student (FTE):* Unit of analysis of higher education enrollment representing the full-time student enrollment plus one-third of the part-time student enrollment.

*Funding Formula:* A mathematical basis for allocating funds to higher education institutions using an analysis of set rates, ratios, and/or percentages.

*Higher Education Institutions:* Four year public higher education institutions supported by state funding that offer bachelor, masters, and doctoral level degrees, not including professional or health-related degree institutions.

*High-Research Institution:* Institution that awards at least 20 research doctoral degrees during the academic year and is ranked high on either Carnegie Classification index that represents the aggregate level of research activity or the per-capita research activity using expenditure and staffing measures divided by the number of full-time faculty.

*Non-Residential Campus:* Fewer than 25 percent of degree-seeking undergraduates live on campus and/or fewer than 50 percent attend full time

*Research University:* Institution that awards at least 20 research doctoral degrees during the academic year and is not ranked high or very high on either Carnegie Classification index that represents the aggregate level of research activity or the per-capita research activity using expenditure and staffing measures divided by the number of full-time faculty.

*Residential Campus:* At least 25 percent of degree-seeking undergraduates live on campus and at least 50 percent attend full time.

*Revenues:* Funds received for the essential education activities of the higher education institution.

*Pell Grant:* A form of federal student financial aid typically awarded to undergraduate students of lower economic status for a maximum amount of \$5,500, dependent primarily on the student's financial need.

*State Appropriations.* Budgeted amounts received by higher education institutions from the state legislature to cover current (partial) operating expenses during a specific period of time.

*State Appropriations per FTE:* The budgeted appropriations received by higher education institutions from the state legislature divided by total full-time equivalent students.

*STEM Program:* Academic programs focused in the fields of science, technology, engineering, and mathematics as categorized by the Integrated Postsecondary Education Data System

*Tuition and Fees:* Revenue assessed against students for instruction and designated educational purposes.

*Very High Research Institution:* Institution that awards at least 20 research doctoral degrees during the academic year and is ranked very high on either Carnegie Classification index that represents the aggregate level of research activity or the per-capita research activity using expenditure and staffing measures divided by the number of full-time faculty.

## CHAPTER II

### REVIEW OF THE LITERATURE

This chapter reviews significant research that has focused on resource allocation for public higher education institutions. The chapter is organized into two main sections. The first section provides an in depth review of the role and rationale for state support for public higher education, influences and challenges involved in state resource allocation, and the process and models of allocating state appropriation. The second section of this chapter examines the theoretically framework used to guide this study.

#### Implications of Access and Choice

The role of financial resource allocation and its effect on equity in higher education has received comparatively less research than other areas in education and finance. Dowd and Grant (2006) argue that the lack of research on this subject may be due to the fact that higher education financial equity is of a lesser concern than the issue of public school finance equity because a higher education is not compulsory, nor has it always been considered essential for success and achievement in life. Also, unlike in public school education, those who attend institutions of higher education are perceived to have the opportunity to choose their institution based on the personal preferences of each student. However, a review of the literature has in fact indicated that some of the same underlying principles present in public school finance equity are also present in public higher education. Particularly, in relation to the restrictions on student access due to limitations in choice, mobility, and the need for a degree as a means to higher

attainment of success, and therefore an emphasis on financial equity at this level of education is also necessary.

Mortenson (1991) suggests that a fundamental component of equity in higher education is student access and ability of choice. However, the limited mobility and financial means of students are barriers to their access and ability to attend any higher education institution of their choice and are primary reasons that equitable funding to all institutions within a state is a significant issue in higher education (Paulsen & St. John, 2002).

Olivas (2005) suggests that often society fails to consider the equity of higher education institutions in terms of “neighborhood schools” as is with K-12 education, but that may at times need to be the case. Greater than 50 percent of entering freshman attend higher education institutions within fifty miles of their residence (Cappex, 2011; Chapman, 1981), and over 85 percent attend higher education institutions within 500 miles of their residence. Mortenson (1991) suggests that an institution’s location close to the student’s residence is continuously rated as a more important factor to students not being able to enroll in their primary choice institution. The various situational contexts present to students can hinder students in respect to their higher education institutions of choice (Chapman, 1981; Heller, 1997). Thus, each institution throughout the locales and regions of the state should be equitably funded to meet the needs of their student populations and carry out the institution’s educational mission.

Merisotis (2005) suggests that cultural concerns are also key issues to be considered when analyzing the access and mobility of students. The Hispanic

population, which is particularly experiencing rapid growth in Florida and Texas, has a high level of students classified as “first generation” and this creates conflict with the family that are not always experienced in other cultures. In the Hispanic culture, the household may support a student’s decision to attend an institution of higher education, but may have expectations for the student to continually reside at home to support the family in various ways, including contributing to the household’s financial resources (Merisotis, 2005).

However, institutional resource equity is still a concern even in situations where student mobility or their need to live closer to home are not factors. Higher education institutions also vary on their prestige and level of academic selectivity used for admissions. Students’ access to higher education institutions may be limited for other reasons such as the institution’s selectivity.

Trow (1984) suggests that higher education institution perceptions are stratified by their prestige and level of resources, and that this stratification seems to correlate to their academic selectivity.

A key barrier to access to these highly ranked institutions is academic selectivity, which favors performance on standardized examinations and higher grade point averages (Astin & Oseguera, 2004). Further, research has shown that when compared on those measures, students in underrepresented and lower socioeconomic groups, or from less educated families, tend to perform at a level lower than students outside of those groups. Thus, even when students have the option of mobility, some are restricted by selectivity



criteria and not in a situation to have access to the more prestigious or selective institutions (Astin & Oseguera, 2004; Fleming, 1990; Valencia & Aburto, 1991).

Hoxby and Turner (2013) suggest that even when acceptance to selective institutions would not be a factor, that high achieving students from lower income groups do not apply to selective institutions at the same rate as their high achieving but high income counterparts. Their literature highlights the fact that these students tend to be greatly dispersed amongst the low achieving and low income schools, thus having high school counselors that have less knowledge, resources, or emphasis on selective higher education institutions. Also, being so dispersed prevents admission staff at the more selective institutions from targeting these schools in the same efficient manner as they do higher achieving schools and areas.

Further, the information that these students obtain via other sources such as the internet, is not always the most reliable data and could be misleading many ways without the proper guidance available to decipher the information for them. There also is a tendency for information geared towards low income student to adhere to false assumptions that these students must also be low achieving, thus not providing them the most beneficial information (Hoxby & Turner, 2013). This result being that high achieving low income students are not reached by the same traditional methods nor receive the traditional information as other high achieving students.

Astin and Oseguera (2004) suggest that highly ranked institutions tend to have substantially more resources than other institutions. The literature states that students from low income households and underrepresented groups tend to comprise higher

proportions of the students unable to attend these institutions having the most selective measures and criteria for admission. This again demonstrates the need for higher education institutions across the state to have equitable resources to meet the needs of all students, not just those students enrolled at the more highly ranked institutions.

Students with high academic performance and no financial need have the opportunity to select from a wider range of institutions than student with lower academic ability and high financial need (Davies & Guppy, 1997). As state funding decreases, public higher education institutions have to rely more heavily on other sources such as private contributions, endowments, and then increasing tuition and fees. When these increases in tuition are coupled with higher admissions selectivity, the result is limiting access and choice, particularly to those with lower income or minority and disadvantaged groups (Haveman & Smeeding, 2006).

#### Cost of Higher Education

Another barrier to access is the cost of tuition in relation to the student's household financial resources (Chapman, 1981; Heller, 1997). Decreases in state funding to higher education institutions coupled with increasing costs of operations have an effect on the resources of the institution, which in turn affect the students (Astin & Oseguera, 2004). The allocation of state appropriations to institutions effect the rate of tuition and fees charged by an institution, as tuition may be adjusted to offset deficiencies in the financial resources allocated by the state that are needed to cover operating expenses.

Due in part to the lack of increases in state appropriation per student, public higher education institutions have raised their tuition levels, on average, by more than three percent a year above the rate of inflation over the last thirty years in an effort to generate resources to remain competitive with the state's private higher education institutions (Ehrenberg, 2005). Data indicates that on average from 1976 to 2005, the tuition at 4-year institutions increased from \$617 to \$5,491 or by 270% when adjusted for inflation; at the same time the median family income as only increased 23% (Long & Riley, 2007). Increases in tuition and fees have a greater impact on low income students than middle or upper class students, as well as African-American students, than other racial groups of students (Heller, 1997; Paulsen & St. John, 2002). Mumper and Freeman (2005) argue that public higher education has traditionally served a role as a means for lower income and disadvantaged students to earn a higher education and that this continued rise in cost may prevent public higher education from successfully performing such a role.

The research has indicated a correlation between tuition increases decreases in the probability of higher education enrollment (Heller, 1997; Leslie & Brinkman, 1987; Terenzini, 2001). Heller (1997) suggests that students respond to the sticker price of the cost of higher education. Leslie and Brinkman (1987) preformed a meta-analysis reviewing 25 studies that examined this relationship between tuition and enrollment and found that all students are sensitive to tuition costs. Their study found that for every \$100 increase in tuition, there would be a 1.8% to 2.4% reduction in enrollment, of who

applied and were admitted. Heller (1997) did a similar examination and stated that for every \$100 increase in tuition, there would be a 0.5% to 1.0% decline in enrollment.

This correlation has an even stronger and negative impact on lower income students. As McPherson and Schapiro (1998) argue that for every \$150 increase in tuition, there would be a 1.6% reduction in enrollment amongst low income students. The research also indicates that minorities, specifically African American students, specify cost of tuition as an important reason for the choice of higher education institution when not enrolled in their primary choice institution (Mortenson, 1991; Paulsen & St. John, 2002). Savoca (1990) argued that these tuition sensitivity studies may actually underestimate the impact of rising tuition costs on higher education enrollment because they examine students who apply and then choose not to enroll. Thus, the studies ignore tuition's impact on students who choose to not even apply to higher education institutions based on the cost of enrollment.

Terenzini (2001) argues that lower socioeconomic students are at a disadvantage with rising tuition costs due to their parents' lack of financial knowledge and preparation for higher education cost. This lack of financial preparation then ties in to student's perceptions of their family's ability to pay. This perception then limits access by narrowing the student's potential choices of higher education institutions.

However, data also indicates trends of an increasing overall enrollment despite tuition increases. In some situations tuition increases have even been shown to demonstrate a positive impact on the probability of student enrollment (Behrman, Kletzer, McPherson & Schapiro, 1992; Heller, 1997; Mumper and Freeman, 2005).

Although certain segments of student enrollment are decreasing from tuition increases, the overall demand for higher education is still present in relation to the total number of students enrolling. As similar to overall population growth, the overall total of students enrolling in higher education institutions is increasing each year. Overall student enrollment in higher education increased by 11 percent from 1990-2000 and by 37 percent from 2000-2010 (US Department of Education, 2011). Specifically, during the years 2005-2010, there was an increase of over 25 percent in Florida and over 15 percent in Texas (US Department of Education, 2011).

When examining white students specifically, enrollment at 4-year institutions amongst in these mentioned prior studies increased as tuition increased (Behrman et al, 1992). The data indicated that higher prices in tuition were demonstrating a quality effect in that higher prices signaled higher quality thus creating an increased incentive for enrollment. Also, the authors argue that increases in tuition at 4-year institutions created a positive increase in enrollment for minority students at 2-year institutions. This indicates that rising tuition cost steer minority students, that would have otherwise pursued a higher education at a 4-year institution, to community colleges while not having a similar effect on white students (Behrman et al, 1992).

Mumper and Freeman (2005) argue that though there is the community college as an educational option available to those students who cannot afford 4-year institutional costs, this is not optimal. State policymakers should not be satisfied with large portions of certain populations being forced into community colleges instead of being able to pursue a 4-year higher education. This ultimately reduces the potential

return on educational investment and earnings for these students. The authors feel that having a community college system in place is necessary, but the focus must still be on maximizing access to all students and addressing the rising cost of tuition, based largely in part due to the reductions in state financial support. Haveman and Smeeding (2006) also argue that this concentration of higher education access to students of higher economic status is reinforced by the decreasing amount of state funding and support for public education.

Heller (1997) argues there will be an increasingly negative effect on student enrollment and the ability to financially support public higher education as states continue their shift from a commitment of utilizing funds to ensure low public tuition levels coupled with the rising cost of higher education. This research illustrates the necessity for equity in funding of higher education institutions as students are already impacted by rising tuition costs. If certain institutions fail to receive an equitable share through resource allocation, this affects their tuition costs, which can result in limiting access to certain populations of students, particularly those most sensitive to financial barriers. Research has indicated that from 2000-2010, an estimated 2 million low income students who otherwise qualified to attend higher education institutions, will not enroll and one of the most significant factors in that decision being the cost of higher education (Mumper & Freeman, 2005).

Institutions can offer greater amounts of financial aid to students to offset the rising costs of tuition. Research has indicated that awarding financial aid to students does increase access to higher education by providing additional means to afford tuition

(Hurtado et al, 1998; St. John, 1991). Perna (2005) suggest that the costs of attendance impacts student enrollment decisions. Ideally, the purpose of financial aid is to diminish the financial needs of the student and to have their access and choice of higher education be determined by educational factors such as an institution's academic reputation, quality, types of academic programs, and other institutional characteristics (Mortenson, 1991).

However, all forms of financial aid do not have equal effects on student access. The federal government has shifted from a policy of awarding grants to one awarding loans as the means of promoting a higher education (Paulsen & St. John, 2002). Increases in tuition negatively relate to enrollment rates, whereas increases in financial aid positively relate to enrollment. Though the source of aid primarily responsible for the positive correlation to enrollment rates are grants as opposed to loans (Perna, 2005). Heller (1997) suggests that the net cost of a grant is different than the net cost of a loan in the same amount. Research has indicated that financial aid that is comprised primarily of loans decrease access to minority students, as those groups are less likely to be in a situation able to take on the financial burden (Hurtado, 1998).

Further, students from households with lower financial resources are more likely to be concerned with the availability of financial aid. Research indicates this availability of financial aid as a key factor in making their decisions whether to attend higher education institutions (Terenzini et al, 2001). Heller (1997) also suggests that students with lower financial resources are less likely to enroll as net costs increase, whereas students with greater financial resources indicate less sensitivity.

Outside of federal or state funding, tuition is a primary source used to generate financial aid and tuition can be increased to generate more financial aid for students with need. However, this cycle of increasing tuition to increase aid can contribute to negative effects detrimental to the students with lower income households (Astin & Oseguera, 2004). This decrease in state support and increase in tuition shifts more of the burden of higher education costs from the public to students and their families. State funding allocation and its relationship to tuition cost is also significant in that research has indicated that students enrolled in public higher education institutions were more negatively responsive to tuition costs and an inadequacy of grant based financial aid (Paulsen & St. John, 2002).

#### Investment in Higher Education: Public vs. Private Good

For years, public higher education has been considered a public good, and thus provided funding by state governments to maintain the public mission, quality, and low tuition of the institutions (Tandberg, 2008). However, public higher education is combating the increasing perception as a private investment and thus should be financed more so by tuition increases rather than increases in state funded appropriations (Ehrenberg, 2005). These anticipated tuition increases are expected to be the greatest at the state's flagship public research institutions, which have the greatest demand for enrollment (Ehrenberg, 2005). Unlike the flagship public research institutions, the public comprehensive institutions ability to replace unmet financial resources is far more challenging. Public comprehensive institutions have the highest enrollment of students



from low income households who are the most sensitive to increased tuition, thus lack of state appropriations might have a negative impact on student access to higher education.

Literature demonstrates the significant benefits of a public higher education system on society. Many researchers have argued that these institutions are major drivers of employment, job skills, and improvements in quality of life, and that public higher education is one of the greatest investments that a state can make to provide an economic, social, and cultural return on investment (Bradford, 2008; Hines, 2000). Higher tax revenue, lower crime and prison population, increased higher voter turnout and civic engagement, decreased funding of public assistance, economic stimulation, greater employment satisfaction, and more philanthropic activities are just some of the public and private benefits researchers have related to investments in higher education (Bowen, 1977; Pascarella & Terenzini, 2005; Perna, 2005; Tandberg, 2008).

Perna (2006) also asserts that access to higher education is a fundamental component to the country's economic prosperity. Having a higher education has become increasingly significant to the United States' global competitiveness, as the trend from an industrial based to an information and technological based economy (Perna, 2006). Employment research suggests that having a higher education as a requirement has increased and that the educational requirements of all jobs, even jobs that at one point may have only required a high school education, have been increasing (Carnevale & Desrochers, 2003). The authors note that 69 percent of white-collar office worker employment, which is one the largest and fastest growing categories as well as being amongst the highest earning categories of employment, had at least some higher

education in 2001, up from 37 percent in 1973 (Carnevale & Desrochers, 2003; Perna, 2006). Research indicates that over 40 percent of all new U.S. jobs require a higher education degree and having a higher education will continue to increasingly be one of the most significant factors of labor market success and a mechanism for decreasing economic inequalities (Haveman & Smeeding, 2006). Thus, ensuring that all students across income, race and ethnicity, and socioeconomic status have the opportunity and access to higher education is crucial to accruing the benefits, both public and private, that stem from a higher education (Perna, 2006).

#### Role of State Appropriations

The fact that higher education institutions' are impacted by alternative financial resources such as the federal government through support for research and student financial aid, tuition and fees, endowments, and donations illustrate the complexity involved in analyzing the issue of financial resource equity. However, although there are various influences on the financial resources of public higher education institutions, none have a more significant role than that of the state government (Cheslock & Hughes, 2011; Hauptman, 2001). State governments allocate financial resources directly to higher education institutions through state appropriations.

Jones (2003) suggests that states provide appropriations to higher education institutions for the primary purpose of building their core capacity. In this sense, states view higher education as a general public interest and good and desire to maintain a public higher education system that can meet the needs of the state. Thus, states have a considerable interest in establishing adequate levels of financial resources for their

higher education institutions, and this support comes through state appropriations. States have to perform a balancing act through their appropriations to ensure adequate levels of financial support while at the same time limiting taxpayers costs (Jones, 2003).

Toutkoushian and Shafiq (2009) assert that states further justify the financial support of public higher education as a way to remedy perceived inequities and inefficiencies in the higher education market. A state providing public higher education can aid in supplying a more equitable system of educational opportunities for its citizenry. Further, the authors suggest that when members of its population receive a higher education, they personally benefit. At the same time the increased pool of educated members leads to additional benefits to society at large. Some of these potential benefits are increased economic development, and employment, in turn producing higher tax revenues, as well as reductions in crime and more civic involvement (Toutkoushian & Shafiq, 2009).

However, Zusman (2005) argues that this viewpoint is steadily changing and more of both policymakers and the public view higher education as primarily a private benefit, rather than a public good. Even though the majority of the public feel that every student should have the opportunity to pursue a higher education, nearly two-thirds of the public also feel that the student and the household should bear the primary financial burden of the higher education. Thus these changing perspectives have to be considered when analyzing the role of state appropriations to higher education institutions.

A state may not be able to control every source of revenue going into the funding of its higher education institutions, but the state does have considerable control over the

allocation of its financial resources to the higher education institutions within the state. Dowd and Grant (2006) suggest that analyzing such factors as geographic and program cost differentials across higher education institutions in a state, economies of scale on different sized campuses, student choice, and their impact on measures of financial resource equity present a challenge and contribute to the limited study of this area. However, the focus on state appropriations in the available literature represents the best available indicator of a state's individual consideration and commitment of financial resources to higher education (Bell, 2008; Doyle, 2007).

#### External Influences on State Appropriations

The literature indicates that higher education, more so than others areas of state budgets is largely influenced by the state's fiscal situation and by other external factors outside the control of higher education (Bell, 2008; Hovey 1999; Kane & Orszag, 2003). There are many different factors involved in the process of determining the level of financial resources that a state uses to fund their public higher education institutions, some of which are very clear and concise and others being more complex and complicated, particularly in harsher economic periods. The state's overall economic situation is the most critical factor impacting public higher education institution's financial resources. An economy with growth produces gains in the states revenues based upon its tax base ability, growth in the economy increases employment and income which in turn increase personal spending providing revenue through state sales taxes. The literature has indicated that state public higher education appropriations have been more strongly correlated to business factors than other components of the state

budget (Tandberg, 2008). In terms of unemployment, a 1 percent increase in unemployment has been associated with decreased state appropriations to public higher education by \$3.80 per capita and a 1 percent decrease in per capita income has been related to a 1.4 percent decrease in state appropriations per FTE (Humphreys, 2000; Tandberg 2008).

Higher education is particularly influenced by the overall economy, along with each state's varying ability to generate revenue through taxation. Prosperous economic conditions increase state appropriations and lesser economic conditions decrease state appropriations. For example, Zusman (2005) notes that due to the economic recession of the early 1990s, states decreased higher education appropriations drastically even while higher education institutions were experiencing enrollment growth. State funding eventually increased to percentages near where they were prior to the recession only to have appropriations decreased again due to the recession of early 2000.

Tandberg (2008) suggests that state legislators have a tendency to decrease funding to public higher education institutions in difficult economic times, however they fail to increase funding back to adequate levels when economic times recover. When this cycle continues, it eventually causes a relative decrease in public higher education funding over time. Kane and Orszag (2003) suggest that these funding trends have begun to demonstrate negative effects on indirect measures of quality in public higher education. Further complicating this issue is that typically when they are harsher economic times, enrollment in public higher education increases (Tandberg, 2008). Thus, although revenue from tuition and fees will increase, the public higher education

institutions have to provide more while receiving less, as it relates to state appropriations.

As the largest discretionary item in state budgets, economic conditions affect higher education greater than other budgeted areas as state legislatures view higher education funding as the “balance wheel” of state budgets (Bell, 2008; Hovey, 1999; Tandberg, 2008). In a sense, state legislatures make a determination of state appropriations to higher education after determining allocations for other funding priorities such as healthcare, the criminal justice system and even K-12 education. As stated, higher education institutions unlike other areas to be funded are thought of as having alternative means of funding if there are decreases in state appropriations.

Hovey (1999) even suggests that this very dynamic of public higher education institutions having the potential of alternative means of revenue production to aid them financially is also one of the primary rationales the states use in their justification for prioritizing other funding needs over that of funding higher education. Hovey argues:

Selection as a balance wheel results from some perceived characteristics of higher education relative to other objects of state spending. First, higher education institutions have separate budgets with reserves of their own and perceived fiscal flexibility to absorb temporary fiscal adversity, unlike state agencies which do not have those features. Second, higher education is perceived as having more flexibility to translate budget changes into employee pay than state agencies which are bound by statewide pay scales, and local education agencies which are subject to collective bargaining and multi-year employee

contracts. Third, higher education is seen as having more flexibility to vary spending levels (e.g. through changes in courses offered and class sizes) than most programs, which have spending levels that are more fixed. Fourth, in most states, higher education has the ability to maintain and increase spending levels by shifting proportions of costs to users by tuition and fee increases (Hovey, 1999, p. 19).

Zusman (2005) suggests that because of the decreases in state appropriations to public institutions, states have become more like minority partners from a fiscal perspective in relation to their financial support. Data indicates that state appropriations for public higher education have continued to decrease as percentage of the institutions revenue as well. In 1977, state appropriations accounted for 46.5 percent of public higher education revenue (Kane, 2003; Tandberg 2008). In the early 1980s, states provided approximately 44 percent of their public higher education institutions' revenue, by 1996, this percentage had decreased to 35.9 percent and by 2008, states provided approximately 32 percent of their public higher education institutions revenue (Kane, 2003; Tandberg 2008; Zhang, 2008). In 2009, state appropriations comprised 29.7 percent of their public higher education institutions' revenue in the state of Florida and 18.7 percent in the state of Texas (National Center for Education Statistics, 2011).

From year to year, these decreases in state appropriations can appear insignificant but they can have very significant consequences, particularly over time. The National Education Association Research Center (2003) indicated:

If a college receives an average of \$5000 per student in support from the state and each student pays \$1000 in tuition, a total of \$6000 is spent on the student's education. However, if the state support is eroded by 10 percent, or \$500, tuition must go up 50 percent to compensate. Small cuts in state support thus result in large relative increases in tuition (p. 3).

### Competing Budgetary Interests

The literature indicates that the primary components of state budgets that are competing interests with most significant effect on higher education funding are K-12 education, healthcare, particularly Medicaid, and corrections (Bell, 2008; Bradford, 2008; McLendon, Hearn & Moker, 2009). Hovey (1999) further notes that safety net programs such as Medicaid or welfare are of increased concern during poor economic conditions as the numbers of individuals eligible for these programs rises, as opposed to better economic condition where the overall need of support for these types of programs decreases. Overall, education is the single-largest sector of state budgets usually comprising nearly half of all appropriations.

Of the state budget, an average of 12 percent is allocated for higher education whereas the larger portion of education appropriations, an average of 33 percent, is allocated for K-12 education (Bell, 2008). In 2010, the State of Florida allocated 7.7 percent to higher education and 20.5 percent to K-12 education; the State of Texas allocated 10 percent to higher education and 29.3 percent to K-12 education (National Association of State Budget Officers, 2011). K-12 education will continue to compete with higher education systems for funding as there has been increased interest in school



performance and accountability. School reforms, such as the *No Child Left Behind Act*, highlight the emphasis on improving student performance and preparation for college or employment.

Kane and Orszag (2003) explain that rises in state financial resources allocated to healthcare, primarily Medicaid, are a critical factor in the decreased funding to higher education. The individuals eligible for Medicaid and the cost of providing Medicaid per enrollee increased significantly from 1980 into the 1990s. Medicaid funding per capita increased from approximately \$125 in 1990 to \$245 in 2000, while higher education funding per capita decreased from \$185 to \$175 over that same period (Kane & Orszag, 2003). These increased costs of Medicaid correlate to 80 percent of decline in higher education funding.

On average, Medicaid became a larger share of the state budgets than higher education in 1990. In 2010, Medicaid represented 22.3 percent of state budgets while Higher education was only 10.2 percent (National Association of Budget Officers, 2011). In 2010, the state of Florida allocated 30 percent of its funding to Medicaid and 7.7 percent to higher education and the state of Texas allocated 24.6 percent to Medicaid and 10 percent to higher education (National Association of Budget Officers, 2011).

The state's justice systems continue to require significant resources due to the increasing criminal population and lengthier prison mandates (Bradford, 2008; Hossler et al, 1997). An emphasis and implementation of security and counter-terrorism policies are requiring budgetary resources. Bradford (2008) suggests additional resources are

also being utilized to support veterans or other individuals that serve in criminal justice or military capacities.

### Trends in Resource Allocation

The continual trend in decreasing state appropriations to public higher education institutions is significant, as the role of states in resource allocation is not decreasing and continues to be key to the revenue of institutions. A large part of the literature on the issue of decreasing financial resources has been focused on the inequality between public and private institutions, but research on the effects of decreased appropriations between public higher education institutions is critical as well (Ehrenberg, 2003).

Cheslock and Gianneschi (2008) argue that every institution's ability produce alternate sources of revenue are also not equal, thus the state's appropriations can significantly impact the level of financial equity and quality among its institutions. For example, Ehrenberg (2003) argues that state appropriations are a primary source of revenue higher education institutions use for faculty salary expenditures. Thus inequity between institutions in state appropriations can impact inequity in the quality and quantity of faculty between the state's institutions as well.

Higher education institutions have variances in their enrollment demand, level of alumni of greater wealth, or the extent of their research infrastructure, and these factors can aid to some degree as they translate into the ability to generate alternate means streams of revenue (Cheslock & Gianneschi, 2008). However, assuming the institutions without such alternatives might receive significantly disproportionate shares of the state's financial resources, then a level of financial stratification among the state's

institutions will increase as state appropriations decrease. Thus, even as the state's financial resource allocation to higher education institutions decline as a proportion of the institution's overall budget, it remains a significant revenue source and critical determinant of the institution's financial resource capabilities (Cheslock & Gianneschi, 2008).

Higher education institutions must have the financial resources to support the educational mission and purpose of the institution. These financial resources are used for a wide array of purposes such as academic support, instruction, research, and student support which are critical in institutions' various educational success. These differences in state spending to higher education institutions hold important implications for students and the institution. Research has shown that each \$1,000 of state appropriations per full-time equivalent student (FTE) is associated with a one percentage point increase in graduation rates among higher education institutions (Zhang, 2006). FTE is considered the most appropriate unit of analysis of enrollment in higher education finance research (Leslie & Huebert, 1988). FTE, as most commonly defined, is a judgment of the number of equivalent students and is formulated as the full-time student enrollment, plus one-third of the part-time student enrollment. Zhang (2009) also argued that based on resource dependence research, state appropriation have a direct impact on instructional expenditures. Zhang (2009) suggests that instructional expenditures were strongly predicted by state appropriations and rather only slightly predicted by gift, grants, and contract revenues. Thus, significant variation in state appropriations across the different

higher education institutions may differentially impact the missions, purposes, and students that these institutions serve (McLendon et al, 2009).

However, Bell (2008) suggests that state appropriation indicators do vary depending on what is being measured. While the percentage of financial resources allocated to higher education from the overall state budget have continually decreased, the actual dollar amount spent on higher education has increased overall (Bell, 2008; McLendon, Hearn, & Mokher, 2009; Weerts & Ronca, 2008). The amount spent on higher education has risen from \$67 billion in 2001 to over \$83 billion by 2007, as enrollment has increased from 7 million to over 10 million. In the state of Florida, allocated state appropriations increased from \$1.6 billion in 1990 to \$3.1 billion in 2009 (National Center for Education Statistics, 2011). In the state of Texas, allocated state appropriations increased from \$2.6 billion in 1990 to \$5.4 billion in 2009 (National Center for Education Statistics, 2011). When analyzing higher education appropriations per FTE, during just the 2005-2007 period, those appropriations also increased over 9 percent (Bell, 2008).

Weerts and Ronca (2008) cite the critiques of research suggesting significant decreases in state appropriations for higher education. The author argues that the perceived decline in state appropriations for higher education as a share of the state budget has been caused by the growth of other revenue sources. Toutkoushian (2006) provides the perspective that the literature should indicate that the relative funding of higher education by the states, rather than the level of funding has decreased. In other words, the growth in financial resources allocated to higher education has not increased

at a rate adequate to maintain the increasing cost of educating students or to fund higher education institutions. Though whichever perspective the researchers indicate, the common theme is that the allocation of state appropriations for higher education institutions continues to be one of the more significant issues currently confronting higher education (McLendon, Hearn, & Mokher, 2006).

#### Allocation of State Appropriations

In higher education finance literature, total educational and general revenue per student is commonly used as a standard financial indicator (Leslie & Heubert, 1988). Educational and general revenue reflect all revenue having a direct and indirect effect on students which result from the mission of the higher education institution, such as instruction, research, and service common at public four-year institutions (MGT, 2011). However, educational and general revenue can be further separated into its own components of state appropriations, tuition and fees, gifts, grants, and contracts, and other income. Thus, research related to the equity and allocation of financial resources focuses primarily on state appropriations. State appropriations are the key indicator of state efforts to support public higher education institutions and are a significant portion of the unrestricted revenue in the operating budgets of public higher education institutions. While institutions receive additional financial resources from other sources such as their endowment and the federal government, state appropriations represent the majority of unrestricted revenues.

The allocation of these resources is designed by the state legislature to provide a level of funding sufficient to meet the educational goals of the state. The process of

resource allocation is constructed in a manner that allows for the flexibility to respond to the changing needs of the state while still ensuring an adequate and equitable distribution of funding (Parmley, Bell, L'Orange & Ligenfelter, 2009). Though, Parmley et al (2009) note that the determination of adequacy is a purview of the state, which at times can be a cause of differing views amongst institutions and policy makers.

There are two types of bodies that can serve to represent public higher education institutions and hold responsibility for planning and presenting budget requests to the state. A state will have either a statewide coordinating board, as the case in Texas with the Texas Higher Education Coordinating Board, or a state governing board, as the case in Florida with the State University System of Florida Board of Governors. Also, the statewide coordinating boards are also responsible for the review and authorization of academic programs, but have a limited role in the personnel and institutional operations, as each institution or system has its own governing board. In comparison, state wide governing boards do have varying levels of responsibility and roles relating to institutional personnel decisions, operations, and governance (Parmley et al, 2009).

State appropriations for the support of general operating expenses allocated to public higher education institutions through these bodies are categorized as base institutional funding or special purpose funding (Bell, 2008). Base institutional funding is allocated for the core functions and educational capacity of the educational institution. Special purpose funding, as it is titled, is allocated by the state for the promotion of specific state priorities, such as performance funding for graduation outcomes or underrepresented students served. The primary focus of the literature in this area is on

base institutional funding, as special purpose funding is a relatively small component of institutional funding. The state's determination and allocation of base institutional funding can be achieved through the use of two general methods, the base plus method, as used in Florida, or the formula funding method as used in Texas.

#### *Base Plus Appropriation Allocation*

The base plus method, also referred to as incremental funding, is the most commonly used funding method in higher education (Hummell, 2012; Sexton, Comunale & Gara, 2012; Zierdt, 2009). The base plus method uses the prior budget allocation as the reference point upon which to make determinations on the new budget allocations. Adjustments are then made for estimated changes in revenues and expenditures, such as enrollment and cost of living changes (Sexton et al, 2012). Typically, base plus funding applies percentage adjustments across all line items or incremental adjustments to specific line items (Hummell, 2012). The simplicity of the base plus model tends to lessen conflicts and expedite decision making on funding matters. Although, these factors usually result in budget increases, they can however result in decreases to the budget if a public higher education institution incurs decreased enrollment or if the state has to change revenue priorities due to the economic conditions (Parmley et al, 2009).

The base plus method provides a certain level of stability in funding for public higher education institutions and the state (Bell, 2008). However, the base plus method is viewed as a method that preserves the status quo, in relation to funding, which can vary as a positive or negative aspect depending on the perspective of an institution

(Jones, 2003). Incentives for institutions to change their funding status depend on the mechanisms by which additional resources are allocated. Typically, increases in enrollment are the primary driver for base funding allocation. Thus, institutions may be incentivized to improve student enrollment and retention rates. However, in such a situation, institutions must be certain of both the availability and significance of the funding gained by these improvements. Otherwise, institutions may opt for the status quo and maintain their current funding status rather than take on such initiatives (Jones, 2003). Also, this method does not emphasize performance or efficiency in budget decisions, thus states have started to shift to other funding methods in recent years (Layzell, 2007).

Hummell (2012) recognizes several drawbacks in the use of base plus funding, as this method makes the flawed assumption that the institution's goals, needs, and priorities have not changed from the prior year. Thus, since the funding process tends to be automatic, there is a lack of examination on changes and reallocation that can be to the detriment of certain divisions and can produce suboptimal results in resource allocation (Verlotta, 2010). As stated, the base plus method does not provide financial incentives related to performance nor does it prioritize funding for divisions that may more heavily support the institution's educational mission and goals.

As indicated, the State of Florida uses a base plus method of establishing the budget allocation for state appropriations (Budget Office, 2012). The process starts at the individual level as each public higher education institution submits a budget request to the State University System based on the prior budget accounting for the areas of



instruction and research, library, student services, plant operation and maintenance, administrative support, and any institutes and centers. The State University System determines an expected state appropriation based on historical funding data and budgets submitted by each individual institution. The State University System then prepares an overall budget request based upon the information received and any new considerations such as enrollment growth or additional academic programs at an institution. Then The State University System's budget request is submitted to the Florida Department of Education as a component of the overall education budget request that is then submitted to the Governor. The Governor then submits the full state budget request as a recommendation to the state legislature. The legislature has the right to make any modifications to the budget and then approves the state budget by passing a general appropriations act.

Once the State of Florida has allocated its state appropriations to the State University System, the State University System begins the distribution process of funding the institutions (Budget Office, 2012). The State University System then determines the funding allocation to each institution based on a review of the actual state appropriations received and the institution's prior budget allocation. The budget allocations are then reviewed and approved jointly by the State University System and Presidents of the public higher education institutions.

#### *Formula Funding Appropriation Allocation*

In contrast to the base plus method of financial resource allocation, the formula funding method determines the budget allocation based on a developed formula. State

public higher education funding formulas have been established for over 60 years and have received attention in the higher education finance literature (Layzell, 1995; Levacic, 2000; Noe, 1986; Mckeown, 1996; Mckeown 1999). The majority of formula funding models primarily focus on enrollment data. The advantage of enrollment based funding formulas is that it enables higher education institutions to respond quickly to major changes in student demand for access to higher education (Dove, 2007). The formula funding method of allocation accounts for such factors as enrollments/FTE, contact hours with distinctions between disciplines and course levels, as well as buildings and classroom space utilized (Jones, 2003). This method is designed to utilize a defined standard of resource allocation as a means of equitable distribution and meeting the needs of the institutions (Parmley et al, 2009). However, with the formula funding method, state legislators have to assess the elements of the formula to ensure that the formula is not creating an environment where public higher education institutions shift their focus on maximizing the allocation of state appropriations rather than on their alignment with state priorities (Bell, 2008).

The funding formula can be a useful tool for state legislative use to allocate appropriated funds to public higher education institutions. Institutional funding prior to the formula funding models tended to be unpredictable and competitive; Noe (1986) stated that:

...the politics surrounding institutional funding was perhaps the greatest single factor contributing to a recent increase of formulas in higher education. Prior to formula funding, each public institution approached the state legislature and

presented its request for funding. This subjective method fostered a great deal of power, politics, and intrigue, resulting in the capstone institutions faring much better than other state institutions. (p.369)

Thus one key rationale for formula funding is that these models provide an objective method for establishing institutional needs on an equitable basis. Formula funding was designed based on the principles of providing adequacy, equity, and stability to the funding process and distribution of state appropriations (Dove, 2007). The models are considered to be more equitable because the determination of an institution's funding is by a standard set of state policies, and therefore, are said to avoid the intervention and influences of individual institutions and politicians (Levacic et al, 2000). However, even literature from earlier research on formula funding indicates that this may not be the case in all situations (Summers, 1975). The ideology that funding formulas can rationalize the resource allocation process and increase objectivity may tend to be overstated when considering the probability that individual institutions will push for elements of the formula most favorable to that institution. It is likely that those institutions possessing the greater political clout and power to influence the legislature, will therefore have more favorable elements included within the formula funding structure than those institutions without such clout or influence.

Though formula funding creates budgets based on certain predetermined characteristics, at times these characteristics can include competing interests and issues (Layzell, 1995). Funding formulas tend to be shaped and modified over time as their implementation is influenced by the varying interests of the educational institutions,

governing bodies, coordinating boards, and state legislators (McKeown, 1996).

According to Dove (2007) the initial objective of formula funding models was to ensure adequacy in appropriations to institutions. In the 1960s, the objective went from adequacy to growth. During the 1970s, the emphasis was on equity. During the 1980s, formulas focused on stability and quality. From the 1990s to present time, the primary objective of formula funding is based on issues of accountability, performance, and reform (Dove, 2007).

McKeown (1999) argued that formula funding creates several advantages to non-formula resource allocation:

- a) Provide an objective method to equitably determine institutional needs.
- b) Reduce political competition and lobbying by institutions within the state.
- c) Provide state officials with a simple and understandable basis for measuring expenditures and revenue needs of campuses and determining the adequacy of support.
- d) Represent a reasonable compromise between public accountability and institutional autonomy.
- e) Ease comparisons between institutions.
- f) Permit policymakers to focus on basic policy questions.
- g) Promote efficiency in institutional operations. (p. 103)

However, McKeown (1999) also argued that formula funding can consist of several disadvantages:

- a) Formulas may be used to reduce all academic programs to a common level of mediocrity by funding each one the same because quantitative measures cannot assess the quality of a program.
- b) Formulas may reduce incentives for

institutions to seek outside funding. c) Formulas may not provide adequate differentiation among institutions. d) Formulas may perpetuate inequities in funding that existed before the advent of the formula. e) Enrollment driven formulas may be inadequate to meet the needs of changing client bases or new program initiatives. f) Formulas cannot serve as substitutes for public policy decisions. g) Formulas are only as accurate as the data on which the formula is based. (p. 103)

Though funding formulas are perceived as models for increasing the rationale of the allocation process and eliminating external influences, Summers (1975) argued that the degree of such elimination depends upon a variety of factors; the majority of which are political in nature or susceptible to some manipulation. McKeown (1996) noted that the components of a funding formula may be constructed to benefit some institutions and not others. Although the intent of formula funding is to increase objectivity, this may not always be the case considering the educational power structure of the state's educational institutions and the likelihood that each institution will assert pressure to implement formula elements that will impact funding most favorable to their respective best interests. Thus, Summers (1975) argued that even with an equal application of the funding mechanism across all institutions, the allocation may still result in inequities to those institutions without as strong political resources.

Currently, the majority of states, including Texas, utilize formula funding models to some degree for resource allocation. Texas was the first state to utilize formula funding after drastic enrollment increases in the 1940s caused conflict and disagreement

on the amount of state appropriations to be given to each of the public higher education institutions (MGT, 2011). Initially, the formula was based on workload factors to compute teaching salaries and did not differentiate between various institutional missions or characteristics. However, by 1957, a newly developed Commission on Higher Education established formulas developed from an extensive study on the role and scope of public higher education institutions (MGT, 2011). To date, the funding formulas have continued to be periodically revised and reviewed by advisory committees as needed.

The Texas legislature convenes every two years and determines the total budgeted allocation of state resources to higher education over a biennial period. After that total allocation has been authorized by the state legislature, the higher education funding formula then determines the actual state appropriation distributed to each public higher education institution (Legislative Budget Board, 2011). Prior to this determination, the Texas Higher Education Coordinating Board's Formula Advisory Committee makes recommendations to the Legislative Budget Board on the parameters of the formula for the upcoming appropriation. The Legislative Budget Board then establishes a funding formula to recommend to the legislature (Legislative Budget Board, 2011). The funding formula is driven heavily on student enrollment, based on student credit hours not student headcount. Thus, if a public higher education institution's enrollment increases or decreases, so does its funding increase or decrease respectively.

The state appropriation is largely comprised of two individual formulas, the Instruction and Operations Formula and the Infrastructure Formula (Legislative Budget Board, 2011). The Instruction and Operations Formula is calculated as:

“Semester Credit Hours x Program/Level Weight x Rate “

Semester credit hours are determined based on how many classes are being offered and the number of students enrolled in these classes at the institution. The weight is determined by program discipline and course level. The rate is set by the legislature, based on recommendations from the Texas Higher Education Coordinating Board (Legislative Budget Board, 2011).

The Infrastructure Formula is calculated as:

“(Adjusted Utility Rate + All Other Rates) x Predicted Square Feet”

The Adjusted Utility Rate is a percentage of a statewide utility rate adjusted to reflect utility costs. This adjusted utility rate is relative to the percentage of infrastructure funds that institutions historically spent on utilities. The statewide utility rate is determined and then adjusted for individual institutions reflective of their utility costs relative to other institutions. The All Other Rate is a percentage of a statewide rate based on costs of the physical plant, custodial services, grounds and maintenance. The Predicted Square Feet is determined from the Texas Higher Education Coordinating Board’s Space Projection Model for Higher Education Institutions (Legislative Budget Board, 2011).

In addition to the allocation based on the Infrastructure Formula, the legislature also provides a \$750,000 infrastructure supplement to institutions with less than 5000 students enrolled. The purpose is that smaller institutions may not be able to fund and

maintain operations based solely on the allocation provided from the Infrastructure Formula (Legislative Budget Board, 2011).

Those two formulas combine to establish the primary basis of state appropriations to Texas public higher education institutions. While in contrast, the base plus method guides the allocation of state appropriations to Florida public higher education institutions. It must be noted that these methods only serve as means of determining the state allocation to each institution. Once the state appropriations have been received, each institution may choose to spend the appropriations in the manner that best suits the institution. State appropriations are unrestricted funds and do not have to be spent in the manner in which the appropriated funds were calculated.

In summary, a review of the literature provided a perspective of the current issues relevant to resource allocation to public higher education. The research indicated that support for public higher education has decreased relative to the overall state budgets over the years. This literature helps to understand the drivers and influences on funding to higher education institutions and the varying models in which funding occurs. Finally, the literature highlights the rationale for state investments in adequate and equitable resources to public higher education institutions.

### Theoretical Framework

All social systems face the important task of allocating limited resources (Pfeffer & Salancik, 1974). This study examines state systems of resource allocation to public higher education institutions. The focus on state appropriations represents the best available indicator of a state's individual consideration and commitment of financial



resources to higher education (Bell, 2008; Doyle, 2007). This study uses rational choice theory as the framework in which to conceptualize the states budgetary behavior and resource allocation process as it provides insight into how state and institution level factors influence the state's decision-making and subsequent levels of funding appropriations for higher education (Weerts & Ronca, 2008). This framework of resource allocation is important because it represents decisions by the state that are at times both critical and contested within the state because financial resources are scarce and institutions compete for a share of the resources available (Pfeffer & Salancik, 1974). Providing adequate and equitable funding significantly impacts public higher education institutions' ability to support their educational mission.

#### *Rational Choice Theory*

Rational choice theory has become a central perspective in economic and political science research and is relevant to this study as political policy decisions form the basis of the government budgetary process. Defined in the most simplistic sense, rational choice theory is based on the premise that individuals, groups, or organizations compare the benefits and costs of their actions prior to implementing potential policies or strategies, to determine which best serve their goals and interests (Tandberg, 2007). Through the rational choice lens, Armadae (1999) suggests that individuals' behavior is strategic and rational in a pursuit to optimize their interests. A rational choice is the action in which individuals decide on the best possible choice given their beliefs and preferences (Bradford, 2008; Satz & Ferejohn, 1994). Thus, rational choice theory

assumes that basis of outcomes can be explained by underlying actions perceived to be the most effective means to achieve goals (Bellah, 2000).

Within the legislative context as an example, Coughlin and Erikson (1986) suggest research has shown that resource allocation can be examined through the median voting model. The median voting model means that legislators pursue actions and policy that align with the preferences of the majority of voters they represent (Toutkoushian & Hollis, 1998). Under this model, the interests of the median voters will outweigh the interests of other voters. The principles of the median voter model can easily be transferred to aligning with the preferences of lobbying or interest groups (Bradford, 2008).

Rational choice theorists have explained that legislators would support resource allocation to the extent that it would increase their probability of reelection. For example, legislators who represent districts that are home to public higher education institutions would then typically be the strongest proponents for adequate funding for higher education (Bradford, 2008). In this case, the legislators would not be receiving any direct benefit from appropriations to higher education; rather the goal would be that advocating such appropriations would prove favorable to their reelection interests (Coughlin & Erikson, 1986). Researchers have indicated that rational individuals choose the option most likely to result in greater satisfaction or most positive outcome.

Volk, Slaughter, and Thomas (2001) argue that under rational choice theory, state appropriation allocations should be made by central decision makers. These key individuals could allocate resources based on levels of performance. Within this rational

choice framework, the competing and compelling interests of efficiency, effectiveness, quality, and productivity would then be present (Scott, 2000). Thus institutions with the highest levels of performance would receive the higher state appropriations. Under this framework, it would be expected that the relationship between performance and funding would be stronger in states that utilize performance funding models, as those performance factors serve as significant criteria in resource allocation (Bradford, 2008).

### *Critiques of Rational Choice Theory*

However, not all literature supports the rational choice theory framework. Goode (1997) summarizes four of the main arguments against rational choice theory:

1) It is really post-dictive, not predictive; that is, only after the action has taken place can we point to its causal elements and forces; when used carelessly, its logical framework can look remarkably like a tautology; 2) it postulates that people try to maximize only material goods or money; 3) it focuses on individual action, and leaves ambiguous the origins or forces that create macro structures and processes; and 4) it postulates a kind of pure rationality that is not common in real life, where we encounter muddle, shifts in decisions because of minor distractions or whims, actions contrary to common sense, and so on. (p. 30)

Goode (1997) asserts that regardless of the outcome of an individual's behavior, rational theorists attempt to show, after the fact, that the goal was to gain a positive interest or avoid a negative. By analyzing actions after the choices, it provides an optimal means of identifying numerous instances of behavior that support the theory. Even when nonrational actions contradict the prediction, the theorist can nevertheless

interpret those actions as increasing the individual's goods by some alternative means or rationale.

Another argument against rational choice theory is that if society was driven off strictly interests in money or power that it could not function adequately (Coleman & Fararo, 1992; Goode, 1997). Society would not be as great holistically, without group constraints or internal and external rewards and punishments. Sociologists suggest that individuals will not be able to buy respect, prestige, or even love, which are all equally as important goods (Goode, 1997).

Additionally, Coleman and Fararo (1992) state that rational choice theory is too individualistic, which undervalues the importance of social structures; and that researches have difficulty moving from the micro to the macro level of analysis. Also, critics question how rational individuals actually are. Particularly in the field of economics and rational behavior, research indicates that individuals are not always acting rational when those individuals really believe they are demonstrating rational behavior. Thus rational choice theory does not account for the fact that individuals' actions can be based on passion or emotion and are not always calculated (Goode, 1997).

In regards to some of the critiques to rational choice theory, Quackenbush (2004) contends that rational choice is a descriptive phrase describing individual theories that use the rationality assumption and that assume outcomes are the result of choices by actors. Assumptions should be evaluated on their usefulness, not by whether or not those assumptions are true. The assumption's usefulness is judged by the empirical validity of the theory that arises from those assumptions (Quackenbush, 2004). Thus,

making the argument that assumptions have to be empirically correct for there to be any usefulness in the theory is logically incorrect and indicates a misunderstanding of the role of assumptions within scientific theory (Quackenbush, 2004).

### *Rational Choice Theory as a Theoretical Framework*

Rational choice theory has been more commonly used to examine policy decisions and development rather than the specifics of state appropriation allocation. However, the fundamental principles of this theory and framework align with the basic underlying approach to this study. That rational choice norms, structures, and strategies comprise the incentives driving behavior. Rational choice theory offers clear explanations of complex organizational behavior when complemented with an understanding of the logic of organizations. As Ostrom (1991) suggests, actions are a product of the values, resources, and attributes of the decision situation. Therefore, the fundamental principles of rationale choice theory are applicable and form the theoretical framework of this study.

The state controls the primary strategies used in its resource allocation for higher education, however its rational choice framework can be influenced by intervening and exogenous factors outside the control of higher education itself (St. John, 1991). Intervening factors influence the state, such as the level of tax revenues being produced or other financial resource obligations of the state that may need consideration. Exogenous factors also influence the state, such as the enrollment demand for public higher education institutions or the economic conditions of the state.

Prior literature has examined factors that collectively play a role in determining resource allocation for higher education and contribute to the context of this study's framework (Weerts & Ronca, 2006). The literature suggests that the desire and capacity to which states will fund systems of higher education is rational. This rational choice perspective suggests that decisions are based on an objective review of data and investigation of alternative choices (Weerts & Ronca, 2008). Government expenditures such as higher education funding are made, in part, on objective measures of current and future conditions and needs of the state. This suggests that higher education funding systems are relative to available revenues and demand. Public demand for higher education is another factor that can be influential in funding appropriations for higher education (Weerts & Ronca, 2008).

Rational perspectives can also be comprised of competitive strategies, which are based on the principle that organizational leaders select optimal strategies to compete with other entities dependent on resources (Weerts & Ronca, 2008). An example would be an institution's desire to increase enrollments as a competitive strategy to receive more state appropriations that are based in part, on institutional enrollment. Also, state legislators also use rational perspectives as competitive strategies to prioritize varying areas of budgetary need over others (Rizzo, 2006).

Some literature argues that expenditure of governmental resources is determined by rational forces as well as political ones (Peterson, 1995). However, the primary focus of this analysis is on the rational method used to fund higher education institutions through funding models with the stated goal of equitable distribution of resources. These

funding models suggest a rational allotment of appropriations based on several factors decided on by the state. Rational choice advocates suggest that an appropriate funding model can be determined by the state and that the resulting system of allocation will provide institutions adequate resources and optimizes the use of such resources efficiently (Neiman & Stambough, 1998).

### CHAPTER III

### METHODOLOGY

#### Research Design

This study is a quantitative examination of the equity of fiscal resources allocated to public higher education institutions in Florida and Texas through state appropriations. This quantitative history approach is actively directed toward the formation and implications of public policy based on historical research and data (Brady, 2001; Monkkonen, 1984). The study examined equity based on fiscal and institution level information from the academic years of 1993-1994 to 2007-2008; 15 years subsequent to the holding of *U.S. v Fordice* and the Office for Civil Rights regulatory requirements issued to Florida and Texas to improve equity in their public systems of higher education.

Multiple statistical analyses were administered to permit a more extensive examination and interpretation. Each statistical analysis will be outlined in greater depth later in the present chapter. This study performed a dispersion analysis of fiscal equity using the Theil's T statistic and Gini Coefficient, two inequality measures commonly used in education finance research (Hale, 2008). A secondary analysis was performed using multiple linear regression to analyze the relationship between allocated state appropriations to an institution and variable institutional level characteristics.

This study examined the equity of states' resource allocation to institutions within the state and how institutional funding and resource allocation impact the equity



of higher educational institutions. The following research questions were addressed in this study:

1. To what extent does the inequality in state appropriations allocated to public higher education institutions in Florida and Texas change over the 15-year span from 1993 to 2007?
2. To what extent do institution-level characteristics explain the variance in state appropriations allocated to public higher education institutions in Florida and Texas during the 15-year span from 1993 to 2007?

Within the primary and secondary analyses, data were examined to measure financial resource equity over a significant period of time. As the literature suggests, the use of longitudinal and panel data allows trends to develop and be examined over time (Diggle, 2002; Rolfe and Liu, 2007; Thomas and Heck, 2001). This recognizes that educational change is both continuous and incremental and does not assume that a singular cross-sectional data analysis would provide sufficient policy explanations.

### *Population*

The units of analysis for this study were the public higher education institutions in the two states of Florida and Texas. As stated in Chapter 1, Florida and Texas were selected based on their demographical, cultural, and educational similarity as well as their applicableness to this research based on the legal and regulatory requirements to improve equity within their higher education systems. By selecting two states rather than one state for this study, a greater level of data will be utilized and provide a more

extensive level of depth to the analysis, as well the ability to compare and contrast state-specific data. The population was limited to only four-year institutions to restrict the focus of this study to institutions that were similar in purpose and method of fiscal resource allocation within the states. Thus, community colleges and two-year institutions granting associate level degrees were excluded from consideration. Also excluded were institutions that grant primarily professional and health degrees, such as law, medicine, and health science centers. These limitations to the population were enacted to increase the reliability and validity of the analysis and policy implications within the context of the examination. The population of institutions ( $N=44$ ) was divided into a subset from the Florida ( $N=10$ ) and the Texas ( $N=34$ ). It is to be noted that the Florida Polytechnic University and New College of Florida were removed from the analysis due to not being independent universities within the Florida system during the entire period of analysis. Florida Polytechnic became an independent university in 2012 and New College of Florida in 2001 as the state's honors college. For the complete list of selected institutions in Florida and Texas, see Appendix A.

#### *Sources of Data*

Three primary data sources were used to collect historical financial and institution-level data from academic years 1993-1994 to 2007-2008. The primary source was the Integrated Postsecondary Education Data System (IPEDS). Additional institutional data not available from IPEDS was collected from the State University System of Florida Board of Governors and from the Texas Higher Education Coordinating Board. The study used data from academic years 1993-1994 to 2007-2008

because this 15-year data set directly follows the legal and regulatory requirements issued to Florida and Texas to improve equity in their public systems of higher education. At the time of this study, AY 2007-2008 was the last year of uniform data available sufficient to perform complete analysis.

IPEDS is a system of interrelated datasets provided by the U.S. Department's National Center for Education Statistics (NCES). The Higher Education Act of 1965 requires that institutions receiving federal financial aid report several categories of data including, but not limited to graduation rates, enrollments, program completions, faculty and staff, finances, institutional prices, and student financial aid (IPEDS, 2011). Data within IPEDS is collected for the purpose of being used at the federal and state level for policy analysis and development and at the institutional level for benchmarking and peer analysis (IPEDS, 2011).

The State University System of Florida Board of Governors (SUSF), previously the Florida Board of Regents, is the central administrative and governing body of the public university system of the state of Florida. Similarly, the Texas Higher Education Coordinating Board (THECB) is the central administrative and governing body of the public university system of the state of Texas. SUSF and THECB both regularly and routinely collect institutional data from all of its member institutions for statewide governance, policy analysis and development, regulatory analysis and compliance, as well a source for public information. Institutional data sent to these governing bodies must conform to uniform and consistent standards and guidelines to ensure accuracy in reporting.

### Data Analysis- Status of Fiscal Equity within the States

The Theil's T statistic was used to address the first research question of whether the status of equity in financial resources allocated to higher education institutions in Florida and Texas had improved over the 15-year span from AY 1993-1994 to AY 2007-2008. For this question, equity was gauged by measuring the dispersion, or inequality, in the distribution of financial resources. A dispersion analysis measured the spread of the values of data around the central tendency and provided an indication of the level of equity in state appropriation allocation between institutions in the state (Trochim, 2006). When no dispersion is present, perfect equality has theoretically been achieved. Horizontal equity measures can be general statistical measures or measures developed from research in finance or income equality, such as the Theil's T statistic (Berne and Stiefel, 1984). Thus, the Theil's statistic was appropriate to measure equity in this study.

Theil's T statistic is a commonly used statistical analysis for equity measurement. Theil's T is derived from the concept of information theory and represents a type of Generalized Entropy measure (Rohde, 2007). Theil's T shares many of the properties of other equity measures and Theil's T as well as the Gini coefficient remain the most popular used analyses of the Generalized Entropy measures (Rohde, 2007; Doyle, 2007).

The Theil's T statistic ranges from "0," reflecting a perfect equal distribution of resources, to  $\ln n$ , where  $n$  is the size of the population (Doyle, 2007). Doyle (2007) contends that compared to the Gini Coefficient, the Theil's T is a more flexible equity measure as it has a lesser reliance on parametric assumptions. Another rationale for

preferring Theil's T statistic in this analysis is that it has a more flexible structure (Hale, 2008). If the datasets used in this analysis were all complete, individual level data for the population of interest, then measures like the Gini Coefficient or coefficient of variation would be sufficient alone for describing equity. However, this data has some degree of aggregation, thus the use of Theil's T statistic is often, from a theoretical perspective, considered a more sound and appropriate measure (Hale, 2008). Thus, for this study the Theil's T statistic was the primary method of analysis with the Gini Coefficient used as a secondary sensitivity check.

The standardized unit of measure to analyze an institution's share of fiscal resources for the Theil's T analysis was the full time equivalent student (FTE). The full time equivalent student is considered the most appropriate unit of analysis in higher education finance research (Leslie and Huebert, 1988). Student FTE is a judgment of the number of equivalent students and for this study, as it is most commonly defined, was formulated as the full-time student enrollment, plus one-third of the part-time student enrollment.

The Theil's T was formulated as:

$$T'_g = \sum_{i=1}^m \left\{ \left( \frac{p_i}{P} \right) * \left( \frac{y_i}{\mu} \right) * \ln \left( \frac{y_i}{\mu} \right) \right\}$$

In the Theil's T formula,  $i$  indexes the groups,  $p_i$  is the population of group  $i$ ,  $P$  is the total population,  $y_i$  is the average income in group  $i$ , and  $\mu$  is the average income across the entire population (Hale, 2008).

Thus to apply Theil's T to this study, each state's Theil's T statistic was computed by the multiplication of an institution's enrollment share (institution's enrollment / state's total enrollment), the quotient of an institution's appropriation per FTE and the state's mean appropriation per FTE (Institution's appropriation per FTE / State's mean appropriation per FTE), and the natural logarithm of the quotient of an institution's appropriation per FTE and the state's mean appropriation per FTE (Institution's appropriation per FTE / State's mean appropriation per FTE).

Calculations of equity were measured by the Theil's T statistic for each state for each year in the 15-year time period of this study as a trend analysis. A comparison of the Theil's T statistic over a series of years illustrated the status of equity over time. The fiscal unit of analysis for the data was the institution's state appropriations. It is also worth noting that Theil's T statistic is insensitive to inflation, thus no inflation measures had to be taken into consideration for this specific analysis. The academic year was indicated on the X-axis and the range of Theil's T statistic was indicated on the Y-axis.

The Theil's T statistic was the primary analysis used to measure dispersion with an additional sensitivity check using the Gini coefficient. The Gini coefficient is an equity measure taken from economist's measures of income inequality (Picus et al., 2001). The Gini coefficient is the ratio of the area between a 45 degree line reflecting a perfectly equal distribution and the area below a Lorenz curve measuring the actual

distribution (Rubenstein et al, 2008). The Gini varies from 0, an indication of perfect equality, to 100, an indication of complete inequality. The Gini coefficient is determined by plotting the cumulative value of the measure of the object as a percent of the total value on the *Y*-axis and the percent increments of the number of observations on the *X*-axis (Picus et al., 2001). The resulting graph indicates the degree of equality in distribution.

The Gini coefficient can be formulated as:

$$G = \frac{\sum_{i=1}^n (2i - n - 1)x'_i}{n^2 \mu}$$

In the Gini coefficient formula, *i* is the institution's rank order number, *n* is the number of total institutions, *x'*<sub>*i*</sub> is the institution's variable value of state appropriation, and *μ* is the state's average appropriation (Hale, 2008).

Picus (2001) indicates that typically in educational finance research, the vertical axis measures the cumulative percentage of institutional expenditures, and the horizontal axis measures the percent of students enrolled in the state. The closer the Gini coefficient value is to 0 suggests greater equality in distribution. The values in educational finance are typically in the 0.1 to 0.2 range (Picus, 2001). It is also worth noting that the Gini coefficient is also insensitive to inflation, thus no inflation measures had to be taken into consideration for this specific analysis.

### Data Analysis – Relationship of Fiscal Equity to Institution-level Characteristics

A multiple linear regression was administered to address the second research question, which probed whether a relationship existed between institution-level characteristics and financial resources allocated to institutions in Florida and Texas during the 15-year span from academic years 1993-1994 to 2007-2008. This analysis was intended to provide greater depth to the examination of fiscal resource equity at these higher education institutions beyond measures of dispersion. The use of multiple equity measures in this study from varied statistical analyses were done to allow a more extensive examination and interpretation.

A regression analysis is the appropriate statistical method to interpret what might be the cause for any variation in state appropriations and the institution-level characteristic (McDonald, 2009). In this study, the allocated state appropriation to the higher education institution is the dependent variable and the institution-level characteristic is the independent variable. Since this study will be examining several institution-level characteristics as independent variables rather than one independent variable, then a multiple regression analysis was performed instead of simple regression.

The null hypothesis of the multiple linear regression analysis is that there is no relationship between the dependent variables and the independent variable. Thus the analysis will indicate that the fit of the observed values of the dependent variable as related to those predicted by the multiple linear regression equation are not greater than what would be expected by chance. Thus, by examining data over this 15-year period, the study indicated the status and the extent of progress in achieving equity of fiscal



resources over time, as well as the relationship of equity to selected institution-level variables.

<b>Dependent Variable</b>
State Appropriation Per FTE (Institution's Appropriation Per FTE, Adjusted for Inflation)
<b>Independent Variables</b>
Time ( <i>Academic Calendar Year: Fall/Spring/Summer</i> )
Pell Grants Awarded ( <i>Percent of Students Receiving Pell Grant Aid</i> )
Minority Demographics ( <i>Percent of Student Enrollment Classified as Minority</i> )
Minority Demographics * Time ( <i>Percent of Student Enrollment Classified as Minority * Academic Calendar Year</i> )
Academic Selectivity ( <i>Entering Freshmen SAT Scores</i> )
STEM Program Focus ( <i>Percent of STEM Degrees Awarded</i> )
Carnegie Research Classification ( <i>Yes/Research = 1, No/Non-Research = 0</i> )
Institution Setting ( <i>Residential Campus = 1, Non-Residential/Commuter Campus = 0</i> )
Institution Size ( <i>Total Student Enrollment</i> )
Economic Condition ( <i>Recession Year = 1, Non-Recession Year = 0</i> )

Table 1. Variables for Multiple Linear Regression Analysis

The state appropriations allocated to each institution by their state will be the focus in this examination of the equity of fiscal resources. The standardized unit of

measure for the dependent variable will be the institution's allocated state appropriations per full time equivalent student. State appropriations will be adjusted for inflation in terms of 2007 constant dollars as discussed later in the chapter.

The literature suggests that the focus on state appropriations represents the best available indicator of a state's individual consideration and commitment of financial resources to higher education (Bell, 2008; Doyle, 2007). A state may not be able to control every source of revenue going into the funding of its higher education institutions, but the state does have considerable control over the allocation of its financial resources to the higher education institutions within the state. States have a considerable interest in establishing adequate levels of fiscal resources the public higher education institutions within the state and this support comes through state appropriations.

As stated with the dispersion analysis, FTE is considered the most appropriate unit of analysis of enrollment in higher education finance research (Leslie and Huebert, 1988). Student FTE is a judgment of the number of equivalent students and for this study, as it is most commonly defined, was formulated as the full-time student enrollment, plus one-third of the part-time student enrollment.

The institution-level characteristics selected for examination are the independent variables in this study. The independent variables of analysis consisted of either measurement data or categorical data which were recoded as dummy variables where appropriate. The independent variables were grouped in three primary categories.

1) Socio-Economic Characteristics – Institution level characteristics that analyzed the relationship between the minority demographics and economic background of the student enrollment and the institutions' fiscal resource allocation.

- Pell Grants Awarded
- Minority Demographics
- Minority Demographics \* Time

These socio-economic variables were significant to examine whether disparities in fiscal equity had any relationship or existed at institutions with larger proportions of their student enrollment representing minorities and poor students, two historically disadvantaged groups. Minority demographics were defined as the student enrollment not classified as white non-Hispanic and measured as a percentage of the total student enrollment at the institution. The degree of lower economic level students enrolled at an institution was measured by the number of students receiving pell grants as a percentage of the total student enrollment. Pell grants are a form of federal student financial aid typically awarded to undergraduate students of lower economic status for a maximum amount of \$5,500, dependent primarily on the student's financial need.

Racial classification and economic status are often joined together and analyzed or discussed as one indicator, and to some degree they are, but it was necessary to still examine both in the context of this study of higher education. Though lower economic students are a very ethnically diverse group, white students although not the majority, represent the largest racial group of low economic students (Kane, 1998; Terenzini,

2001). However, it is also noted that white students are in fact the significant majority of higher economic students in higher education (Terenzini, 2001).

The hypothesis for this set of variables in the study was the regression analysis would indicate a negative relationship between the institution's allocated state appropriations per full time equivalent student and the socio-economic characteristic variables.

2) Academic Characteristics – Institution level characteristics that analyzed the relationship between the academic achievement of entering students, the focus of the academic programs and degrees awarded and the institutions' fiscal resource allocation.

- Academic Selectivity
- STEM Program Focus
- Carnegie Research Classification

These academic variables were significant to examine whether disparities in fiscal equity had any relationship or existed at institutions with a generally higher level of academic selectivity or breadth and type of academic programs and graduate degree availability, characteristics that have historically been perceived advantageous to higher education institutions.

Academic selectivity is the most commonly used indicator of institutional quality or excellence (Astin and Oseguera, 2004). Academic selectivity was defined and measured in this study as the institutions average entering freshmen SAT score. STEM fields were the type of academic programs focused on in this analysis and were defined as degrees in the fields of science, technology, engineering, and mathematics as

categorized by the Integrated Postsecondary Education Data System. STEM degrees were measured as the total STEM degrees awarded as a percentage of the total degrees awarded at the institution.

This Carnegie Research Classification variable was based upon the Carnegie Basic Classification description. The classification description was defined by the standards set by the Carnegie Classification of Institutions of Higher Education. The Carnegie Classification has been a recognized and accepted means of describing higher education institutions for over 40 years. The classifications are derived from empirical data on higher education institutions and routinely updated for use in educational research and policy analysis (Carnegie Foundation, 2012). To be classified as a research university, the institution must have awarded at least 20 research doctoral degrees during the academic year. Institutions that awarded fewer than 20 research doctoral degrees during the academic year were classified as a non-research university. For the multiple regression analysis, institutions that were classified as research institutions were coded as 1, while institutions that were not classified as research were coded as 0.

While the literature is not settled on whether these characteristics provide the best educational experience for students, these characteristics are definitely given much consideration to the perceived level of academic prestige at higher education institutions which offer greater opportunities upon graduation (Bowen and Bok, 1998; Astin and Oseguera, 2004). However, studies have also indicated that students from the lower socioeconomics and minority groups are underrepresented in these institutions (Carnevale & Rose, 2003; Babco, 2003).

The hypothesis for this set of variables in the study was the regression analysis would indicate a positive relationship between the institution's allocated state appropriations per full time equivalent student and the academic characteristic variables.

3) Institution Type – Institution type analyzed the relationship between the type of the institutions and the institutions' fiscal resource allocation.

- Institution Setting
- Institution Size

These institution type variables were significant to examine whether disparities in fiscal equity had any relationship or existed at institutions that are designated as certain types or classification. The Institution Setting variable was based upon the Carnegie Setting Classification description. To be classified as a residential campus, at least 25 percent of degree-seeking undergraduates live on campus and at least 50 percent attend full time. To be classified as a non-residential/commuter campus, fewer than 25 percent of degree-seeking undergraduates live on campus and/or fewer than 50 percent attend full time. For the multiple regression analysis, institutions that were classified as residential were coded as 1, while institutions that were classified as non-residential/commuter were coded as 0. The Institution Size variable was defined and measured as the total student enrollment for the academic year of analysis in this study.

Literature suggests that the state legislatures and administrative agencies, being the primary bodies in control of state appropriations, weigh various factors in their allocation process. Institutions that receive greater focus from the public, such as those with higher research classification and enrollments or that are largely residential in

nature, could presumably garner greater attention to their institutional needs (Astin and Oseguera, 2004; Layzell and Lyddon, 1990; Weerts and Wonca, 2008). Thus, the hypothesis for this set of variables in the study was the regression analysis would indicate a positive relationship between the institution's allocated state appropriations per full time equivalent student and the classification type variables.

Finally, the study also includes the additional Economic Condition variable to add a greater depth of analysis related to the research question. The literature indicates that higher education, more so than others areas of state budgets is largely influenced by the state's fiscal situation and by other external factors outside the control of higher education (Bell, 2008; Hovey 1999; Kane & Orszag, 2003). Since higher education is particularly influenced by the overall economy, this variable indicates whether a U.S. recession was present during that academic year. For years where a U.S. recession occurred, the years were coded as 1, while non-recession years were coded as 0 (National Bureau of Economic Research, 2014).

Any instances of measuring inflation within the data set utilized a specialized price index for higher education analysis (Brady, 2001). In this case, this research used the Higher Education Price Index (HEPI) as needed. The HEPI is an inflation index constructed to consider the significant cost drivers associated with higher education and is a more representative indication of changes in the institution's costs than the commonly used Consumer Price Index (Commonfund, 2012). HEPI assigned budget weights based on analyses of price levels from a reference year. Fiscal year 1983 is the base year and other years are index for comparison. The HEPI measures the average

relative level of prices in a fixed set of goods and services purchased by higher education institutions each year through current fund educational and general expenditures, excluding research. These cost components include administrative, service, clerical, and faculty salaries, benefits, supplies and materials, utilities, and other related services (Commonfund, 2012). In 2005, Commonfund Institute assumed responsibility from the Research Associates of Washington for maintaining HEPI and the annual calculations of the change rate.

The data was analyzed using SPSS statistical analysis software. SPSS is a general purpose statistical analysis software packages commonly used in social science research. The statistical procedures were selected due to their applicability to the research question and objectives. Treatment of all data will be restricted to the research question and objectives of this study. Any cases of missing data points within these collected data sets were replaced by substituted values through imputation. Imputation was performed to avoid any decreases in the size of the data set and potential statistical bias or misrepresentation of the population caused by the listwise deletion of missing data.

#### Limitations and Trustworthiness

This analysis may be limited in two ways. Measuring only state appropriations ignores other important sources of revenues to institutions from the state. As stated earlier, higher education institutions also have alternate sources of funding from other government and private sectors. Also, Doyle (2007) indicates that states rely on both state and local appropriations in funding higher education, with some level of control



over the allocation of these local funds maintained by the state. However, the use of state appropriations in this study serves as the best available indicator of a state's consideration of financial resources to higher education (Doyle, 2007).

A significant portion of the data used in this analysis was obtained from IPEDS. IPEDS states that, “the completion of all IPEDS surveys, in a timely and accurate manner, is mandatory for all institutions that participate in or are applicants for participation in any Federal financial assistance program authorized by Title IV of the Higher Education Act (HEA) of 1965, as amended. The completion of the surveys is mandated by 20 USC 1094, Section 487(a)(17) and 34 CFR 668.14(b)(19).”

However, the possibilities of inaccuracies will be present with any database of information. Therefore, data used in this research will be cross referenced for accuracy with other data sets used in this study, when both data sets provide similar information. When possible, data reported at the institutional level through the State University System of Florida Board of Governors, and the Texas Higher Education Coordinating Board will be the preferable data source used in this analysis in lieu of IPEDS.

## CHAPTER IV

### ANALYSIS OF DATA

This study is a quantitative examination of the equity of state appropriations allocated to four-year public higher education institutions within Florida and Texas. This analysis reviewed institutional funding to address gaps in our understanding of how the allocation of state appropriations impact the equity of higher educational institutions. The study examined equity based on fiscal and institution level information from the academic years of 1993 to 2007; 15 years subsequent to the holding of *U.S. v Fordice* and the Office for Civil Rights regulatory requirements issued to Florida and Texas to improve equity in their public systems of higher education.

Multiple inequality measures commonly used in educational research and regression analyses were administered to permit a more extensive examination and interpretation of the data to answer the two research questions that guided the study. This chapter reports the findings in two sections, each addressing one of the research questions. Section one addresses research question one and presents the results of a dispersion analysis of the fiscal equity within each state using the Theil's T statistic and Gini Coefficient. A trend analysis of each state's Theil's T over time as well as the decomposition of Theil's T at the institution level is reported. A trend analysis of each state's Gini coefficient over time as well as an analysis of the resulting Lorenz Curve is also reported. Sections two address research question two and presents the results of

descriptive, correlation, and multiple regression analyses used to examine the relationship between allocated state appropriations and institution-level characteristics.

#### Research Question #1

To what extent does the inequality of state appropriations allocated to public higher education institutions in Florida and Texas change over the 15-year span from 1993 to 2007?

#### *Theil's T Analysis of Florida Institutions*

The Theil's T trend analysis of inequality in state appropriation per FTE of public institutions in the state of Florida from the academic years of 1993 through 2007 is presented in Figure 4.1. The Theil's T statistic reflects a greater level of equality in the distribution of state appropriations per FTE as it approaches "0". Florida's Theil's T statistic was 0.053 in AY 93-94 and decreased to 0.022 in AY 07-08. Thus, Figure 4.1 indicates that there was an overall increase in the equality of the allocation of state appropriations to institutions in Florida over this 15 year span. This is further demonstrated by the overlay of state appropriations per FTE's linear trendline in Figure 1, which indicates a similar overall downtrend ( $y = -0.0017x + 0.0499$ ,  $R^2=0.7986$ ) in the Theil's T statistic.

However, this increase in equality was not constant throughout the 15 years. There was a significant increase in the Theil's T statistic and a resulting decrease in equality of state appropriations in AY 98-99. AY 98-99 is also the year that Florida System added Florida Gulf Coast University into the state higher education system and started allocating state appropriations to the institution. After AY 98-99, there was an

overall increase in equality of state appropriations over the next six academic years until AY 05-06. AY 05-06 started a two year period of decreasing equality of state appropriations until AY 07-08 where the data indicated a significant decrease in the Theil's T statistic, resulting in the highest level of equality in the allocation of state appropriations during this 15 year span.

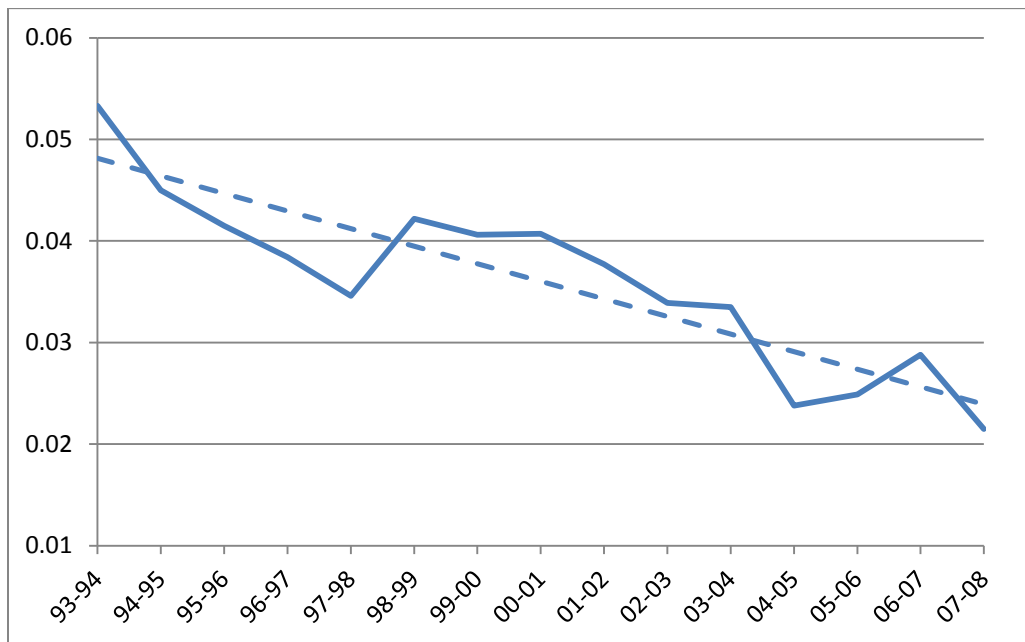


Figure 1. Florida: Trend Analysis of Theil's T Statistic (AY 93-94 through AY 07-08)

The largest positive and negative contributions to the Theil's T analysis of public institutions in the state of Florida from the academic years of 1993 through 2007 are presented in Figure 2. The data indicate that the University of Florida and the University of South Florida, two of the four largest institutions in Florida, contributed the most significant overall positive Theil elements which decreased equality in state appropriations per FTE amongst the institutions. However, as figure 2 illustrates, those positive contributions decreased in magnitude consistent with the overall trend of increased equality of state appropriations amongst institutions over the 15 year time span shown in Figure 1. The data from AY 00-01 also includes a positive Theil element from Florida Gulf Coast University that is not present in the two years prior. Florida Gulf Coast University then contributes a negative Theil element in the following academic year data points. The data is consistent with the trend represented in figure 1 of an initial decrease in equality after the inclusion of Florida Gulf Coast University that then resumes a gradual increase in equality of appropriations thereafter. Figure 2 indicates a higher level of consistency of the institutions contributing negative Theil elements over the 15 year time span.

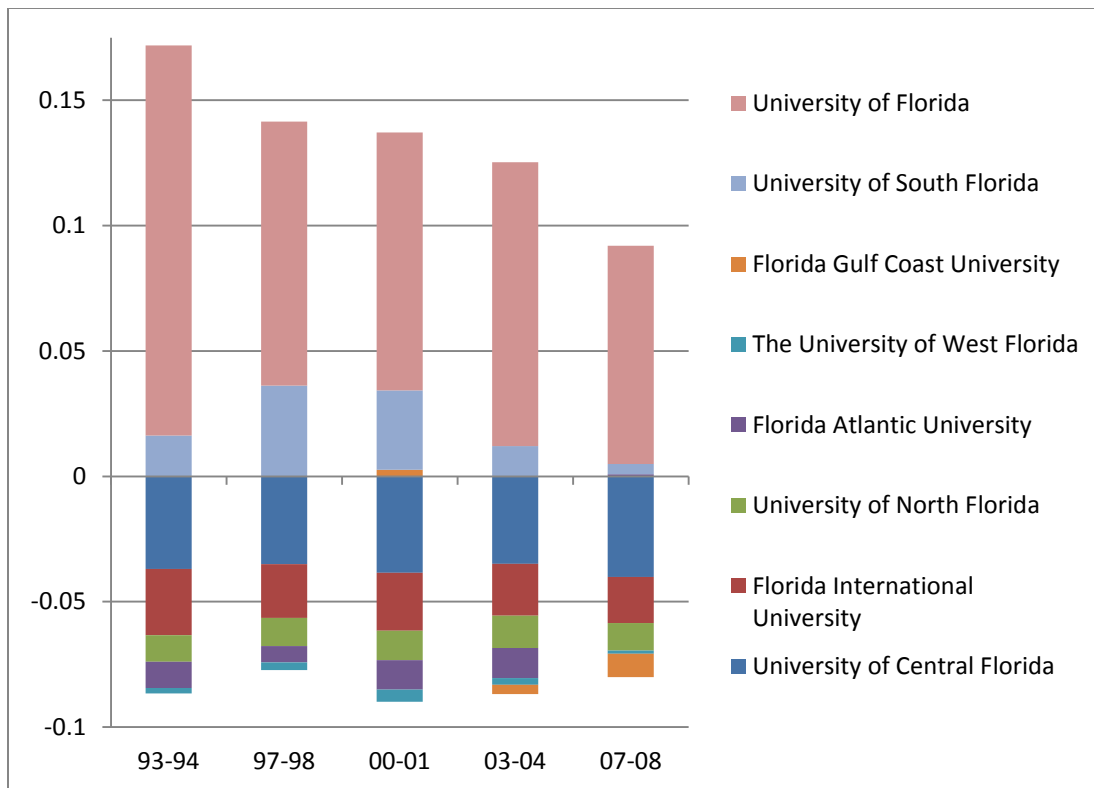


Figure 2. Florida: Largest Positive/Negative Contributions to Theil's T Statistic

### *Theil's T Analysis of Texas Institutions*

The Theil's T trend analysis of inequality in state appropriation per FTE of public institutions in the state of Texas from the academic years of 1993 through 2007 is presented in Figure 3. The Theil's T statistic reflects a greater level of equality in the distribution of state appropriations as it approaches "0". Texas' Theil's T statistic was 0.051 in AY 93-94 and decreased to 0.048 in AY 07-08. Thus, Figure 3 indicates that there was an overall increase in the equality of the allocation of state appropriations to institutions in Texas over this 15 year span. However, this increase in equality was not constant throughout the 15 years, as there were several significant changes and

fluctuations in the data. The first two years of analysis resulted in an increasing level of equality in the allocation of state appropriations amongst Texas institutions. In AY 96-97, the status of equality began to decrease but only

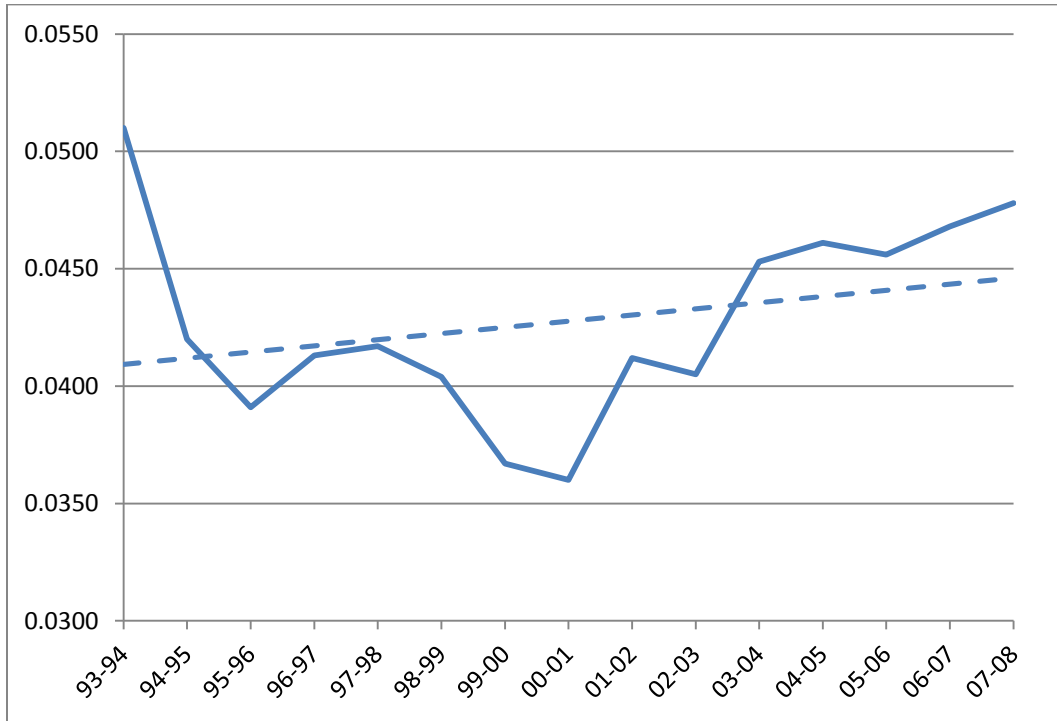


Figure 3. Texas: Trend Analysis of Theil's T Statistic (AY 93-94 through AY 07-08)

briefly as equality resumed increasing from AY 98-99 through AY 00-01. Figure 3 indicates that from AY 00-01 to AY 07-08, the last year of analysis, the Theil's T statistic increased, resulting in decreasing levels of equality in the allocation of state appropriations.

Therefore, even though the status of equality in the allocation of state appropriations was greater in AY 07-08 than in AY 93-94, the data indicate a consistent pattern of decreasing levels of equality projecting forward based on the Theil's T statistic. During this time 15 year time span, Theil's T had reached a low of 0.036 in AY 00-01. Although Theil's T had increased to 0.048 by AY 07-08, a statistic higher than all other academic years other than AY 93-94, the first year of the analysis. This is further demonstrated by the overlay of state appropriations per FTE's linear trendline in Figure 3, which indicates a similar overall uptrend ( $y = 0.0003x + 0.0407$ ,  $R^2=0.078$ ) in the Theil's T statistic.

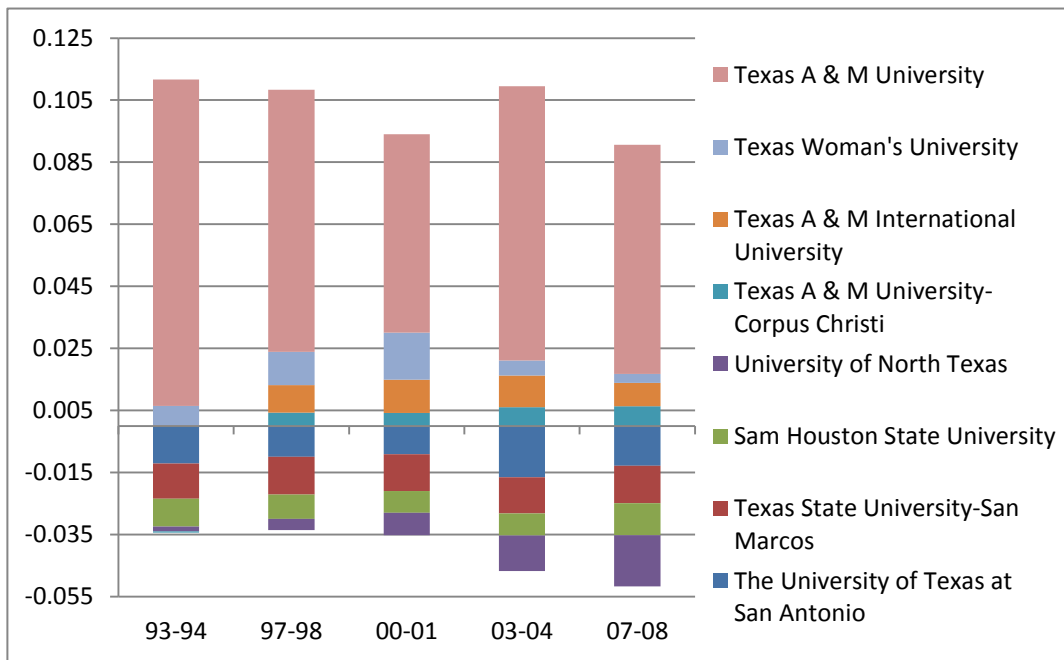


Figure 4. Texas: Largest Positive/Negative Contributions to Theil's T Statistic



The largest positive and negative contributions to the Theil's T analysis of public institutions in the state of Texas from the academic years of 1993 through 2007 are presented in Figure 4. The data indicated that Texas A&M University, one of the two largest institutions in Texas, contributed the most significant overall positive Theil element which decreased equality in state appropriations per FTE amongst the institutions. However, as figure 4 illustrates, the size of those positive contributions decreased and increased in a pattern similarly consistent with the overall trend of increased equality of state appropriations amongst institutions over the 15 year time span shown in Figure 4.3. The data presented in figure 4 also indicates positive Theil contributions from Texas A&M International and Texas A&M Corpus Christi from the AY 97-98 data point forward which decreased equality in state appropriations per FTE amongst institutions. Figure 4.4 indicates a higher level of consistency of the institutions contributing negative Theil elements, with the University of North Texas contributing increasingly negative Theil elements to the Theil statistic, over the 15 year time span.

#### *Theil's T Comparison Analysis of Florida and Texas Institutions*

The Theil's T trend analysis of the equality in state appropriation per FTE of public institutions in the states of Florida and Texas from the academic years of 1993 through 2007 is presented in Figure 5. The Theil's T statistic is sensitive to the number of institutions within each state so a direct comparison between the two Theil's T statistics cannot be made. Figure 5 does indicate the difference in the overall status of equality in state appropriation funding between the institutions in these two states over time. As stated, data from the trend analysis illustrates a net increase in equality over

time in both states. However, there is a continuous and consistent increase in the equality of appropriations in Florida compared to the gradual reverse of equality in Texas with an demonstrated linear uptrend of decreasing equality occurring over time.

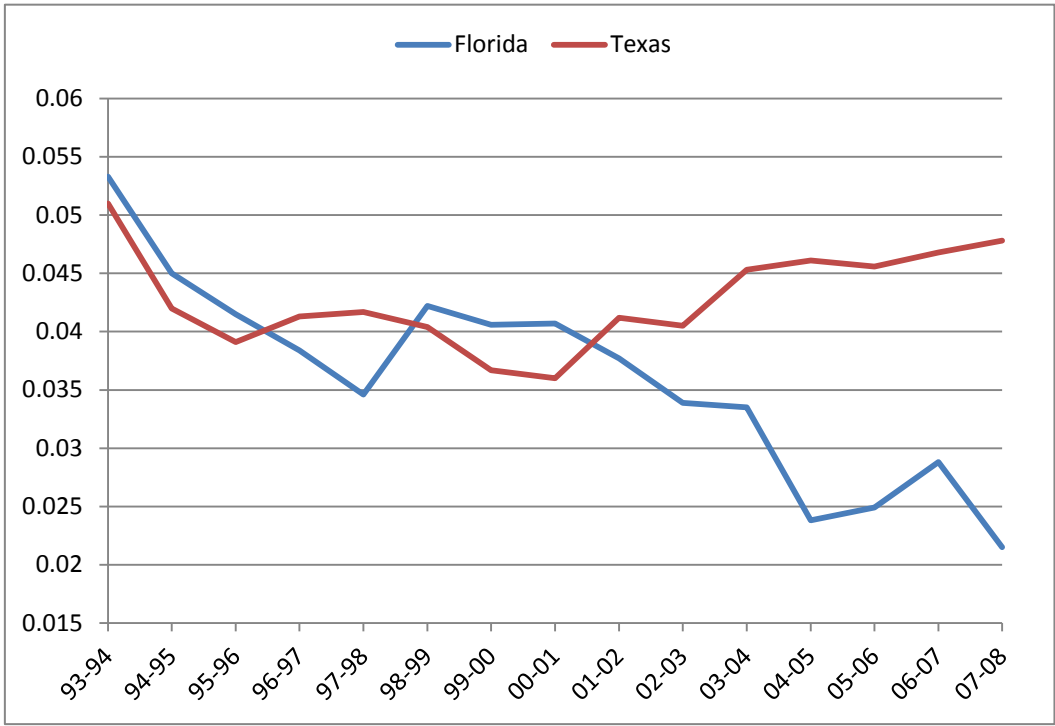


Figure 5. Florida & Texas: Analysis of Theil's T Statistic (AY 93-94 through AY07-08)

Academic Year	Florida		Texas	
	Theil	% Change	Theil	% Change
1993-1994	0.053	0.0	0.051	0.0
1994-1995	0.045	-15.6	0.042	-17.6
1995-1996	0.042	-7.8	0.039	-6.9
1996-1997	0.038	-7.5	0.041	5.6
1997-1998	0.035	-9.9	0.042	1.0
1998-1999	0.042	22.0	0.040	-3.1
1999-2000	0.041	-3.8	0.037	-9.2
2000-2001	0.041	0.2	0.036	-1.9
2001-2002	0.038	-7.4	0.041	14.4
2002-2003	0.034	-10.1	0.041	-1.7
2003-2004	0.034	-1.2	0.045	11.9
2004-2005	0.024	-29.0	0.046	1.8
2005-2006	0.025	4.6	0.046	-1.1
2006-2007	0.029	15.7	0.047	2.6
2007-2008	0.022	-25.3	0.048	2.1
<b>1993-2007 (Total)</b>		<b>-59.7</b>		<b>-6.3</b>

Table 2. Florida & Texas: % Change in Theil Statistic (AY 93-93 through AY 07-08)

The percentage of change in the Theil's T statistic of public institutions in the state of Florida and Texas from the academic years of 1993 through 2007 is presented in Table 2. Similarly to the data in Figure 5, the Theil's T statistic is sensitive to the number of institutions within each state so a direct comparison between the two Theil's T statistics cannot be made. However, Table 2 does summarize a comparison in the overall rate of change in equality in state appropriation funding between the institutions in these two states over time. Florida's Theil's T statistic decreased 59.7 percent from 0.053 in AY 93-94 to 0.022 in AY 07-08. Funding equality either increased or was maintained in 11 of the 15 years of data presented. Texas' Theil's T statistic decreased

6.3 percent from 0.051 in AY 93-94 to 0.048 in AY 07-08. Funding equality either increased or was maintained in 8 of the 15 years of data presented. Texas' Theil's T statistic had decreased 29.4 percent from 0.051 in AY 93-94 to 0.036 in AY 00-01, but from that year on there was a gradual increase in the Theil's T statistic resulting from a decrease in equality of state appropriation funding amongst institutions in Texas.

#### *Gini Coefficient Analysis of Florida Institutions*

Figure 6 presents the Gini coefficient trend analysis of inequality in state appropriation funding of public institutions in the state of Florida from the academic years of 1993 through 2007. Unlike the Theil's T analysis of Florida, the Gini coefficient data is not disaggregated at the per FTE student level, but rather indicates total distribution of state appropriations per institution. The Gini coefficient reflects a greater level of equality in the distribution of state appropriations to each institution as it approaches "0". Florida's Gini coefficient was 0.435 in AY 93-94 and decreased to 0.383 in AY 07-08. Thus, Figure 6 indicates that there was an overall increase in the equality of the allocation of state appropriations to institutions in Florida over this 15 year span. This is further demonstrated by the overlay of state appropriations per FTE's linear trendline in Figure 4.6, which indicates a similar overall downtrend ( $y = -0.0017x + 0.4244$ ,  $R^2=0.2969$ ) in the Gini coefficient.

However, this increase in equality was not constant throughout the 15 years. There was a significant increase in the Gini coefficient and a resulting decrease in equality of state appropriations in AY 98-99. AY 98-99 is also the year that Florida System added Florida Gulf Coast University into the state higher education system and

started allocating state appropriations to the institution. After AY 98-99, there was an overall increase in equality of state appropriations over the next seven academic years until AY 06-07. AY 06-07 started a one year period of decreasing equality of state appropriations until AY 07-08 where the data indicated a significant decrease in the Gini coefficient, resulting in the highest level of equality in the allocation of state appropriations during this 15 year span.

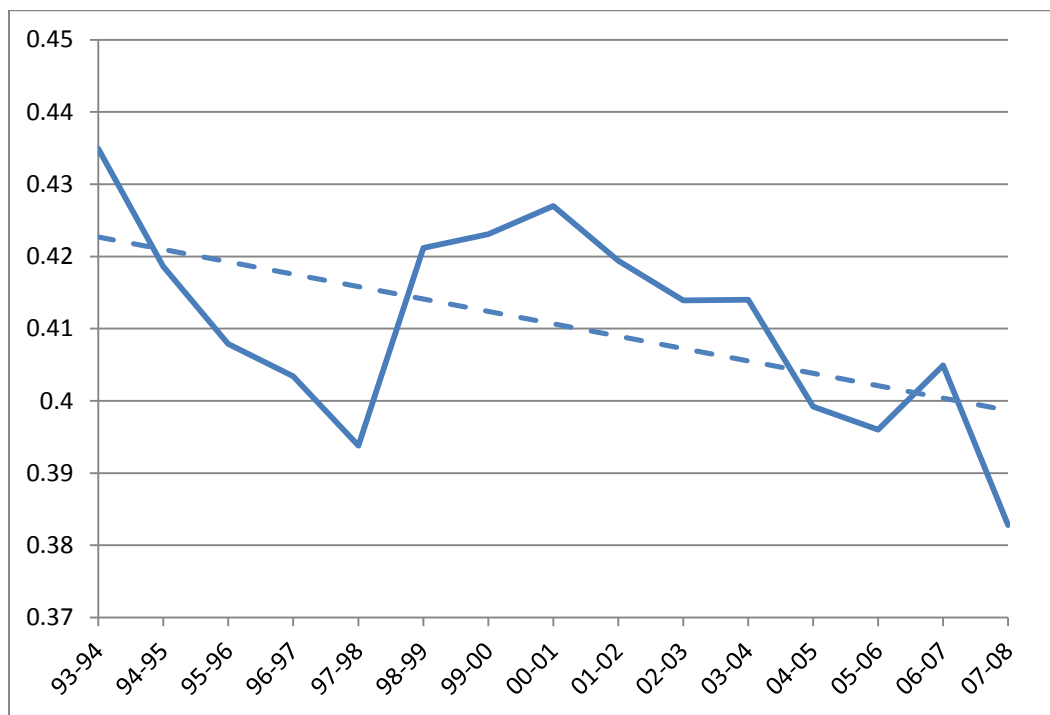


Figure 6. Florida: Trend Analysis of Gini Coefficient (AY 93-94 through AY 07-08)

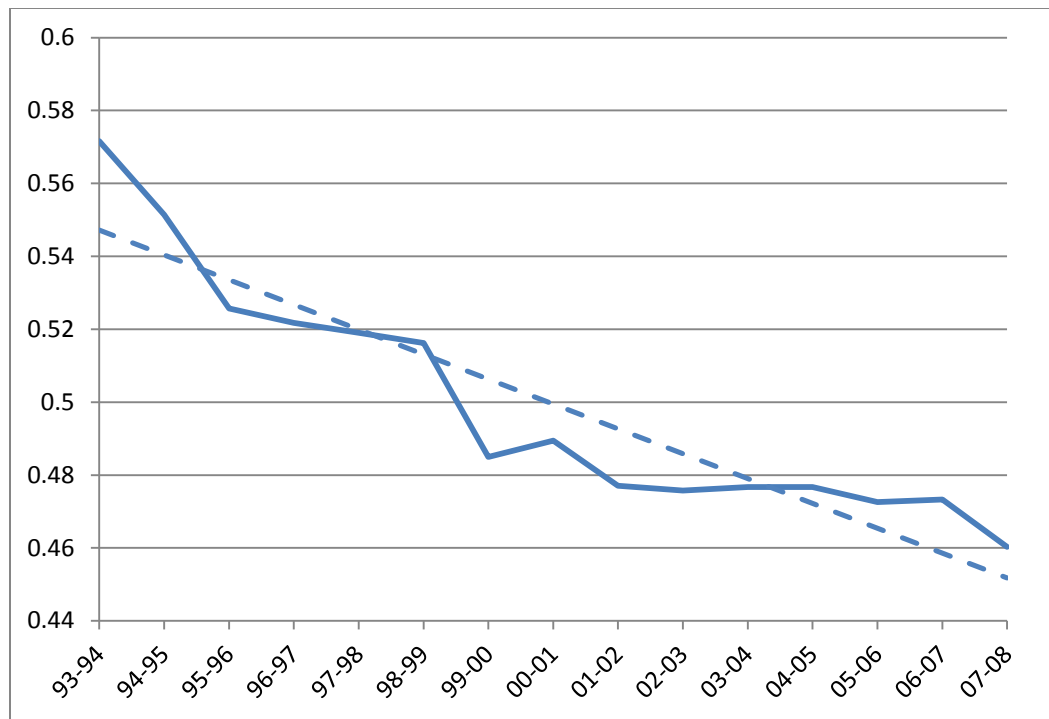


Figure 7. Texas: Trend Analysis of Gini Coefficient (AY 93-94 through AY 07-08)

#### *Gini Coefficient Analysis of Texas Institutions*

Figure 7 presents the Gini coefficient trend analysis of inequality in state appropriation funding of public institutions in the state of Texas from the academic years of 1993 through 2007. Unlike the Theil's T analysis of Texas, the Gini coefficient data is not disaggregated at the per FTE student level, but rather indicates total distribution of state appropriations per institution. The Gini coefficient reflects a greater level of equality in the distribution of state appropriations to each institution as it approaches "0". Texas' Gini coefficient was 0.572 in AY 93-94 and decreased to 0.460 in AY 07-08.

Thus, Figure 7 indicates that there was an overall increase in the equality of the allocation of state appropriations to institutions in Texas over this 15 year span. This increase in equality was relatively constant throughout the 15 years, with minor decreases in equality of appropriations in AY 00-01 and AY 06-07. This is further demonstrated by the overlay of state appropriations per FTE's linear trendline in Figure 7, which indicates a similar overall downtrend ( $y = -0.0068x + 0.554$ ,  $R^2=0.8621$ ) in the Gini coefficient.

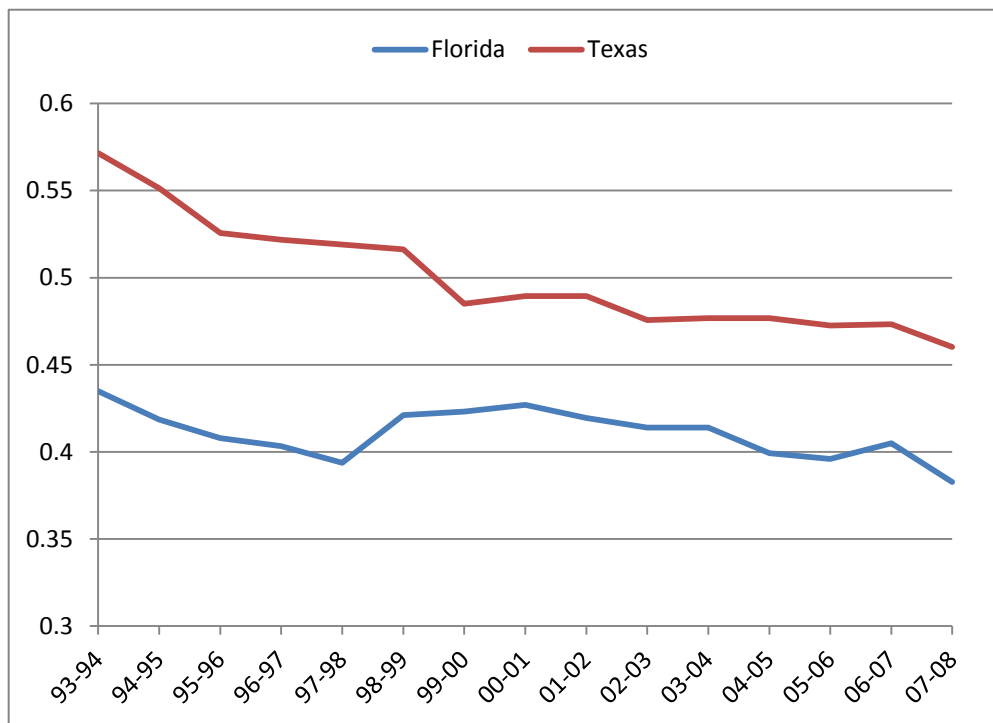


Figure 8. Florida & Texas: Trend Analysis of Gini Coefficient (AY 93-94 through AY07-08)

### *Gini Coefficient Comparison Analysis of Florida and Texas Institutions*

The Gini coefficient trend analyses of the inequality in state appropriation funding of public institutions in the states of Florida and Texas from the academic years of 1993 through 2007 are presented in Figure 8. Figure 8 indicates the difference in the overall status of equality in state appropriation funding between the institutions in these two states over time. The trend analysis data reported a higher level of equality in state appropriation funding in Florida than Texas, although there was an overall increase in funding equality over time in both states. However, the Gini coefficient indicates there is a more continuous and consistent increase in the equality of appropriations to institutions in Texas compared to the decrease and then gradual increase in appropriations equality in Florida over the same time.

The percentage of change in the Gini coefficient of public institutions in the states of Florida and Texas from the academic years of 1993 through 2007 is presented in Table 3. Similarly to the data in Figure 8, Table 3 summarizes a comparison in the overall rate of change in equality of state appropriation funding between the institutions in these two states over time. Florida's Gini coefficient decreased 12.0 percent from 0.435 in AY 93-94 to 0.383 in AY 07-08. Equality of appropriations either increased or was maintained in 11 of the 15 years of data presented. Texas' Gini coefficient decreased 19.5 percent from 0.572 in AY 93-94 to 0.460 in AY 07-08. Equality of appropriations either increased or was maintained in 12 of the 15 years of data presented.



Academic Year	Florida		Texas	
	Gini	% Change	Gini	% Change
1993-1994	0.435	0.0	0.572	0.0
1994-1995	0.419	-3.7	0.551	-3.5
1995-1996	0.408	-2.6	0.526	-4.7
1996-1997	0.403	-1.1	0.522	-0.8
1997-1998	0.394	-2.4	0.519	-0.5
1998-1999	0.421	7.0	0.516	-0.5
1999-2000	0.423	0.5	0.485	-6.0
2000-2001	0.427	0.9	0.489	0.9
2001-2002	0.419	-1.8	0.489	0.0
2002-2003	0.414	-1.3	0.476	-2.8
2003-2004	0.414	0.0	0.477	0.2
2004-2005	0.399	-3.6	0.477	0.0
2005-2006	0.396	-0.8	0.473	-0.9
2006-2007	0.405	2.2	0.473	0.1
2007-2008	0.383	-5.5	0.460	-2.7
<b>1993-2007 (Total)</b>		<b>-12.0</b>		<b>-19.5</b>

Table 3. Florida & Texas: % Change in Gini Coefficient (AY 93-93 through AY 07-08)

Research Question #2:

To what extent do institution-level characteristics explain the variance in state appropriations allocated to public higher education institutions in Florida and Texas during the 15-year span from 1993 to 2007?

*Analysis of Florida Institutions*

The degree of the relationship between state appropriations per FTE and the institution-level characteristics in Florida is reported in Table 4. State appropriation per FTE has the highest positive and significant correlation with an institutions percentage of STEM field majors ( $r = .531$ ). State appropriation per FTE is also positively and

significantly correlated with students' average entering SAT score, classification as a Very-High Research institution, student enrollment, and the institution's setting. State appropriation per FTE has highest negative and significant correlation with time in academic years ( $r = -.226$ ). State appropriation per FTE is also negatively and significantly correlated with classification as a High-Research institution. State appropriation per FTE is not significantly correlated with percent of minority students, percent minority students over time, classification as a Research institution, or economic conditions.

The full multiple regression model with all twelve predictors is statistically significant and can explain approximately 64 percent of the variance the institutions' appropriation per FTE in Florida,  $R^2 = .644$ ,  $F(12, 130) = 19.59$ ,  $p < .001$ . The results indicate that there are two institution-level characteristics that are positive and significant predictors of state appropriation per FTE: 1) institution's setting and 2) student enrollment. An institution's enrollment ( $b = 0.94$ ) is the strongest positive and significant predictor of state appropriations per FTE, indicating that each additional student enrolled may lead to a \$0.21 increase in state appropriations per FTE. In other terms, every additional 1,000 students enrolled may lead to a \$210 increase in state appropriations per FTE, all else being constant.

The results also indicate that there are two institution-level characteristics that are negative and significant predictors of state appropriations per FTE: 1) percentage of minority students and 2) each academic year over time. An institution's percentage of minority students ( $b = -.905$ ) is the strongest negative and significant predictor of state

appropriations per FTE, indicating that each additional percentage of minority students enrolled at the institution may lead to a decrease of \$97 in state appropriations.

However, there is also a significant interaction present between percentage of minority students and time in academic years. This indicates that the decrease in state appropriations predicted by the percentage of minority students lessened over time with a \$3 increase in appropriations with each academic year of the study. Overall, the null hypothesis presented in this study is rejected and proven to be false. The results suggest that some institution-level characteristics may significantly explain some of the variance in state appropriations allocated to public higher education institutions in Florida.

A bi-directional stepwise regression model was also performed on the Florida data to provide further analysis and is summarized in Table 5. Stepwise criteria probability of F to enter was less than or equal 0.050, and probability of F to remove was greater than or equal to 0.100. The stepwise regression results indicates the best fitting model to predict state appropriations per FTE based on the institution-level characteristics as all non-significant characteristics were eliminated from the model. The significant contribution of each characteristic was determined based on the value added to the  $R^2$  statistic. The results indicate that seven institution-level characteristics significantly contributed to the predictive value of state appropriations per FTE. The stepwise regression explains approximately 63 percent of the variance the institutions appropriation per FTE in Florida,  $R^2 = .628$ ,  $F(7, 135) = 32.60$ ,  $p < .001$ .

Variable	Descriptive		Coefficients		Variable Correlations											
	M	SD	B	Beta	1	2	3	4	5	6	7	8	9	10	11	12
1. Appropriations Per FTE	10391	2721	---	----	----											
2. %Minority	38.8	25.3	-.97**	-.905	-.113											
3. %Pell Grant	28	8.7	.68	.217	.195**	.776**										
4. SAT Score	1096	76	-6.25	-.175	.373**	.463**	.747**									
5. %STEM Major	16	5.5	.106	.214	.531**	.034	-.041	.371**								
6. VH-Research	Yes=42%, No=58%		-.2038	.371	.427**	.373**	.565**	.696**	.556**							
7. H-Research	Yes=21%, No=79%		.228	.034	.183**	.355**	.293**	.209**	.183**	.438**						
8. Research	Yes=21%, No=79%		.1416	.213	-.013	.380**	.684**	.536**	-.167*	.438**	.265**					
9. Setting	Res=27%, NRes=73%		.3298*	.537	.406**	.340	.091	-.068	-.035	-.030	.310**	.273**				
10. Enrollment	20434	12075	0.21**	.94	.435**	-.075	.440**	.765**	.620**	.826**	-.077	.515**	.058			
11. Economic Condition	Yes=14%, No=86%		-.247	.032	-.114	.034	-.014	-.025	-.051	-.016	-.010	-.010	.031	.061		
12. Academic Year	-----		-.228**	.362	-.226**	.103	.085	-.038	.211**	-.039	-.023	-.023	.076	.201*	.356*	
13. %Minority*AcadYear	12.49	230	3.09*	.261	-.035	.881**	.757**	.403**	.060	.307**	.339**	.330**	.256*	-.053	.035	.085

B (Unstandardized Coefficient) / Beta (Standardized Coefficient)

\*\*Significant at the 0.01 level (2-tailed) / \*Significant at the 0.05 level (2-tailed)

Table 4. Florida: Multiple Regression Results (Full Model)

Variable	Descriptive		Coefficients		Variable Correlations						
	M	SD	B	Beta	1	2	3	4	5	6	7
1. Appropriations Per FTE	10391	2721	---	----	----						
2. %Minority	38.8	25.3	-86.4**	-0.805	-.113						
3. %Pell Grant	28	8.7	186**	0.595	-.195**	.776**					
4. %STEM Major	16	5.5	96.1*	0.194	.531**	.034	-.041				
5. VH-Research	Yes=42%, No=58%		-1747*	-0.318	.427**	-.373**	-.565**	.556**			
6. Setting	Res=27%, NRes=73%		3701**	0.603	.406**	.340**	.091	-.035	-.030		
7. Enrollment	20434	12075	0.185**	0.819	.435**	-.075	-.440**	.620**	.826**	.058	
8. Academic Year	-----		-236**	-0.375	-.226**	.103	.085	-.211**	-.039	.076	.201**

B (Unstandardized Coefficient) / Beta (Standardized Coefficient)

\*\*Significant at the 0.01 level (2-tailed) / \*Significant at the 0.05 level (2-tailed)

Table 5. Florida: Multiple Regression Results (Stepwise Model)

The percentage of STEM field majors was a positive predictor that explained 28 percent of the variance in the model. Student enrollment was the strongest predictor ( $b = .819$ ) in the model. Accordingly, each additional student enrolled may lead to a \$0.19 increase in state appropriations per FTE. In other terms, every additional 1,000 students enrolled may lead to a \$190 increase in state appropriations per FTE, all else being constant. The remaining positive predictors in the model were institution's setting and percentage of Pell grant recipients.

The percentage of minority students was the strongest negative predictor ( $b = -.805$ ) and explained 9 percent of the variance in the model. Accordingly, each additional percentage of minority students enrolled may lead to a \$86 decrease in state appropriations per FTE, all else being constant. The remaining negative predictors in the model were time in academic years and classification as a Very-High Research institution.

#### *Analysis of Texas Institutions*

The degree of the relationship between state appropriations per FTE and the institution-level characteristics in Texas is reported in Table 6. State appropriation per FTE has the highest positive and significant correlation with an institutions percentage of STEM filed majors ( $r = .119$ ). State appropriation per FTE is also positively and significantly correlated with the institutional setting and classification as a Very-High Research institution. State appropriation per FTE has highest negative and significant correlation with time in academic years ( $r = -.225$ ). State appropriation per FTE is also negatively and significantly correlated with an institution's total student enrollment,

classification as a High-Research institution, percentage minority students, and percentage minority students over time. State appropriation per FTE is not significantly correlated with average entering SAT score, percentage Pell grant recipients, economic condition and classification as a Research institution.

The full multiple regression model with all twelve predictors is statistically significant and can explain approximately 31 percent of the variance the institutions' appropriation per FTE in Texas,  $R^2 = .309$ ,  $F(12, 440)$ ,  $p < .001$ . The results indicate that there are three institution-level characteristics that are positive and significant predictors of state appropriation per FTE: 1) classification as a Very-High Research institution, 2) classification as a High Research institution, and 3) classification as a Research institution. A classification as a Very-High Research ( $b = .872$ ) is the strongest positive and significant predictor of state appropriations per FTE. All of the positive and significant predictors of state appropriations related to the level of research production by the institution.

The results also indicate that there are two institution-level characteristics that are negative and significant predictor of state appropriations per FTE: 1) student enrollment and 2) time in academic years. An institution's total student enrollment ( $b = -1.01$ ) is the strongest negative and significant predictor of state appropriations per FTE, indicating that each additional student enrolled may lead to a decrease of \$0.25 in state appropriations. In other terms, every additional 1,000 students enrolled may lead to a \$250 decrease in state appropriations. Overall, the null hypothesis is rejected and proven to be false. The results suggest that some institution-level characteristics may

significantly explain some of the variance in state appropriations allocated to public higher education institutions in Texas.

A bidirectional stepwise regression model was also performed on the Texas data to provide further analysis and is summarized in Table 6. Stepwise criteria probability of F to enter the model was less than or equal 0.050, and probability of F to remove was greater than or equal to 0.100. The stepwise regression results indicates the best fitting model to predict state appropriations per FTE based on the institution-level characteristics as all non-significant characteristics were eliminated from the model. The significant contribution of each characteristic was determined based on the value added to the  $R^2$  statistic. The results indicate that six institution-level characteristics significantly contributed to the predictive value of state appropriations per FTE. The stepwise regression explains approximately 30 percent of the variance the institutions appropriation per FTE in Texas,  $R^2 = .302$ ,  $F(6, 445)$ ,  $p < .001$ .

Classification as a Very-High Research institution was the strongest positive predictor in the model ( $b = .847$ ) and explained 13 percent of the variance. The remaining positive predictors in the model were classification as a High Research institution, classification as a Research institution and average entering SAT score. Total student enrollment was the strongest negative predictor in the model ( $b = -1.041$ ) and explained four percent of the variance. In this model, each additional student enrolled may lead to a \$0.25 decrease in state appropriations per FTE. In other terms, every additional 1,000 students enrolled may lead to a \$250 decrease in state



Variable	Descriptive		Coefficients		Variable Correlations											
	M	SD	B	Beta	1	2	3	4	5	6	7	8	9	10	11	12
1. Appropriations Per FTE	8225	2721	---	----	----											
2. %Minority	43.7	26.6	-4.49	-.041	-.088*											
3. %Pell Grant	29.9	13.2	4.51	.021	.017	.646**										
4. SAT Score	985	99	3.01	.104	-.032	.515**	.695**									
5. %STEM Major	11.9	10.2	17.3	.062	.119**	-.016	-.095*	.391**								
6. VH-Research	Yes=9%, No=91%		8716*	.872	.110**	-.053	.307**	.520**	.360**							
7. H-Research	Yes=18%, No=82%		1832*	.246	.193**	.027	.228**	.354**	.209**	.148**						
8. Research	Yes=21%, No=79%		784*	.112	.048	.080*	.145**	.304**	.104**	.163**	.242**					
9. Setting	Res=24%, NonRes=76%		183	.027	.069**	-.074*	.346**	.141**	.202**	.176**	-.079*	.116**				
10. Enrollment	12915	11711	-.25**	1.01	.211**	-.056	.421**	.664**	.331**	.769**	.323**	.178**	.217**			
11. Economic Condition	Yes=14%, No=86%		465	.055	-.035	.062	.041	-.010	-.035	.001	.001	.002	.004	.031		
12. Academic Year	-----		-.100**	-.153	.222**	.175**	.149**	.023	.041	-.001	-.002	-.002	-.001	.086*	.358*	
13. %Minority*AcadYear	15.4	235	-.09	.007	-.076*	.874**	.587**	.460**	.001	-.051	.031	.061	-.082*	.053	.064	.148*

B (Unstandardized Coefficient) / Beta (Standardized Coefficient)

\*\*Significant at the 0.01 level (2-tailed) / \*Significant at the 0.05 level (2-tailed)

Table 6. Texas: Multiple Regression Results (Full Model)

Variable	Descriptive		Coefficients		Variable Correlations					
	M	SD	B	Beta	1	2	3	4	5	6
1. Appropriations Per FTE	8225	2721	---	---	---					
2. SAT Score	985	99	4.19**	.146	-.032					
3. VH-Research	Yes=9%, No=91%		8855**	.895	.110**	.520**				
4. H-Research	Yes=18%, No=82%		1859**	.252	-.193**	.354**	-.148**			
5. Research	Yes=21%, No=79%		811**	.117	.048	-.304**	-.163**	-.242**		
6. Enrollment	12915	11711	-.25**	-1.04	-.211**	.664**	.769**	.323**	-.178**	
7. Academic Year	-----		-.89**	-.137	-.222**	.023	-.001	-.002	-.002	.086*

B (Unstandardized Coefficient) / Beta (Standardized Coefficient)

\*\*Significant at the 0.01 level (2-tailed) / \*Significant at the 0.05 level (2-tailed)

Table 7. Texas: Multiple Regression Results (Stepwise Model)

appropriations per FTE, all else being constant. Time in academic years was also a negative and predictor in this model.

In this model, each additional student enrolled may lead to a \$0.25 decrease in state appropriations per FTE. In other terms, every additional 1,000 students enrolled may lead to a \$250 decrease in state appropriations per FTE, all else being constant. Time in academic years was also a negative and predictor in this model.

#### *Comparison Analysis of Florida and Texas Institutions*

The data indicated that institution's state appropriation per FTE in Florida and Texas had varied strengths of predictors based on the multiple regression models used in this analysis. The stepwise model explains for approximately 63 percent of the variance in Florida, although the stepwise model only explains for approximately 30 percent of the variance in Texas. When considering all characteristics of analysis in Florida, the variance in appropriation per FTE is primarily predicted by student enrollment and minority demographics. Whereas in Texas, the variance in appropriation per FTE is primarily predicted by the classification as a Very-High Research institution and student enrollment. Further, considering only the significantly contributing characteristics that impacted the model, the variance in appropriation per FTE in Florida is again primarily predicted by predicted by student enrollment and minority demographics. However, in Texas, the variance in appropriation per FTE is again primarily predicted by the classification as a Very-High Research institution and student enrollment.

### Summary of Results

The findings of the inequality measures administered in this study indicated that the net equality of state appropriation per FTE at public higher education institutions in Florida and Texas have increased from the academic years of 1993 through 2007. However, unlike in Florida, the data also indicated a trend of decreasing equality in Texas. The findings also indicated that 63 percent and 22 percent of the institution's variance in state appropriation per FTE, in Florida and Texas respectively, could be explained by the regression model used in this study. When considering all institution level characteristics in Florida, the variance in state appropriation per FTE is primarily predicted by student enrollment and minority demographics. Whereas in Texas, the variance in state appropriation per FTE is primarily predicted by the classification as a Very-High Research institution and student enrollment. Chapter five will offer conclusions drawn from the findings of this study, implications for practice and recommendations for future research.

## CHAPTER V

### CONCLUSION

This study examined the equity of state appropriations allocated to four-year public higher education institutions within Florida and Texas. The preceding chapters reviewed relevant literature on the issue, discussed the design and methodology of the study, and an analysis of the findings. This chapter offers a brief overview of the study, presents conclusions and implications of the findings, and provides recommendations for future research.

#### Brief Overview of the Study

This study examined institutional funding to address gaps in our understanding of how the allocation of state appropriations impact the equity of higher educational institutions. The focus on state appropriations represents the best available indicator of a state's individual consideration and commitment of financial resources to higher education (Bell, 2008; Doyle, 2007). The allocation of financial resources to higher education institutions impacts college affordability, enrollment capacity and academic quality of higher education (AASCU, 2012).

This study used rational choice theory as the framework in which to conceptualize the states budgetary behavior and resource allocation process as it provided insight into how state and institution level factors influenced the state's decision-making and subsequent levels of funding appropriations for higher education (Weerts & Ronca, 2008). As stated in the literature review, rational choice theory is

based on the premise that individuals, groups, or organizations compare the benefits and costs of their actions prior to implementing potential policies or strategies, to determine which best serve their goals and interests (Tandberg, 2007). Through the rational choice lens, Armadae (1999) suggests that behavior is strategic and rational in a pursuit to optimize their interests. Thus, rational choice theory assumes that basis of outcomes can be explained by underlying actions perceived to be the most effective means to achieve goals (Bellah, 2000). This framework of resource allocation is important because it represents decisions by the state that are at times both critical and contested because financial resources are scarce and institutions compete for a share of the resources available (Pfeffer & Salancik, 1974). Providing adequate and equitable funding significantly impacts public higher education institutions' ability to support their educational mission.

This study was comprised of 44 public higher education institutions, of which 10 were Florida institutions and 34 were Texas institutions. The primary sources of data used to collect historical financial and institution-level information was the Integrated Postsecondary Education Data System (IPEDS) as well as the State University System of Florida Board of Governors and the Texas Higher Education Coordinating Board. Multiple analyses were administered to permit a more extensive examination and interpretation.

This study performed a dispersion analysis of state appropriations per FTE using inequality measures commonly used in education finance research (Hale, 2008). A dispersion analysis measured the spread of the values of data around the central tendency

and provided an indication of the level of equity in state appropriation allocation between institutions in the state (Trochim, 2006). Additionally, a secondary analysis was performed using multiple linear regression to analyze the relationship between allocated state appropriations to an institution and institution- level characteristics. This analysis was intended to provide greater depth to the examination of fiscal resource equity at these higher education institutions beyond measures of dispersion. A regression analysis is the appropriate statistical method to interpret what might be the cause for any variation in state appropriations and the institution-level characteristic (McDonald, 2009).

### Analysis and Discussion

What follows is a discussion of the findings that emerged from the data analysis of this study. The study analyzed equity based on fiscal and institution level data from the academic years of 1993 to 2007; 15 years subsequent to the holding of *U.S. v Fordice* and the Office for Civil Rights regulatory requirements issued to Florida and Texas to improve equity in their public higher education systems. Under *U.S. v Fordice*, states must implement measures to assure that no evidence of de jure systems of segregation remain present and continue to produce discriminatory effects upon higher education institutions. The state system's distribution of financial resources for its higher educational institutions is one of the factors examined (Cantu, 1994). However, this study broadened the examination of financial equity not just at the historically black colleges and universities, but across all the public higher education institutions within Florida and Texas.

The overall results of the dispersion analysis indicated that the inequality of state appropriations in both Florida and Texas decreased over the 15 year span from 1993 to 2007. Table 4.1 indicated that Florida's Theil's T statistic decreased from 0.053 to 0.022, and Texas' Theil's T statistic decreased from 0.051 to 0.048. Although a direct comparison between the two states cannot be made from this primary analysis of the Theil's T statistic, as it is sensitive to the number of institutions within each state, this data represented an overall change of 59.7 percent and 6.3 percent respectively within the two states.

However, a major difference in the status of appropriation funding between the two states was that the inequality in Florida demonstrated a more steady and continual trend of improvement throughout the time period and consistent linear trends of increasing equality over time, unlike in Texas. Inequality levels did increase during 1997-1998; although this could probably be attributed to being the year Florida added Florida Gulf Coast University into the State University System which presumably affected resource allocation. Within the next year, the data indicate levels of inequality began to decrease in Florida once again.

Whereas in Texas, inequality levels decreased until approximately the midpoint of this 15 year span of analysis and then data indicate state appropriation levels reversed into a continuous and steady increase in inequality. So although there was an overall net decrease in inequality in Texas over this period of analysis, the decrease is far less significant than it would have been had the levels of continuous improvement in the equality of appropriation funding been maintained. Further, the stated reversal in



equality produced a linear trendline in the Thiel's T analysis indicating a decreasing level of equality over time.

In both Florida and Texas, the largest negative contributors to the Thiel's T Statistic and levels of inequality in state appropriations were the larger flagship institutions, The University of Florida and Texas A&M University respectively. Even though these two states have two different budgetary systems for state appropriations, Florida's being the base plus model and Texas's being formula funding driven, the Thiel's T analysis indicated that both state's allocated a significant amount of financial resources to the premier institutions within the state. Which from a rational choice theory perspective, demonstrates the state's emphasis on these institutions though their higher level of funding.

As Leslie and Heubert (1988) argued, the institution's financial resources are of educational significance because money is a fundamental resource for providing programs, services, and meeting its human and logistical needs. However, the presence of unequal shares of financial resources to various higher education institutions does not solely within itself indicate a problem within the respective resource allocation model of the state. Certain institutions may in fact be funded to higher degrees based on rational, legitimate, education-based principles and policy rather than arbitrary or biased determinants for such allocation. Thus, the second question in this study sought to address to what extent institution-level characteristics explain the variance in state appropriations allocated to public higher education institutions in Florida and Texas.

*Relationship between Institutional Characteristics and State Appropriations per FTE*

Overall, Tables 4 and 6 indicated that there were several significant institutional characteristics that correlated, both positively and negatively, to the level of state appropriations per FTE students in Florida and Texas. In Florida, the results suggested that enrollment, very high research activity, entering SAT score, and higher concentrations of STEM field majors related to higher levels of state appropriations per FTE. However, what stands out in this analysis is that it is not the case of certain institutions having some of these stated characteristics and maybe not others, but rather the same institutions, namely Florida State University, the University of Central Florida, the University of Florida, and the University of South Florida, possess all four characteristics and the other institutions possess a few or none. Thus, as indicated in Table 8, the institutions with the largest enrollments are also the same institutions with the highest levels of research activity, higher entering SAT scores, and are also the same institutions primarily offering the highest concentration of STEM majors.

Institutions	State Appropriations per FTE*	Enrollment*	% VH-R*	% STEM*	SAT Score*	% Minority *	% Pell Grant*
FSU/UCF/UF/USF	\$11,753	32,196	100%	19.5%	1160	27.8%	22.8%
Remaining Florida Institutions	\$9,509	11,570	0%	12.8%	1050	44.6%	31.5%
*Significantly different at the 0.05 level (2-tailed t-test)							

Table 8. Florida: Analysis of Institutional Characteristics

Again, a funding model where institutions that are more focused on very high research and STEM fields having higher levels of appropriation funding could be based on sound and rational educational policy. However, according to the data displayed in Table 8, there should still be concern that these same institutional characteristics that related to higher levels of state appropriations also had negative relationships to the percentage of minority students enrolled, as well as the percentage of students receiving Pell grants. This is significant in that it appears that students in underrepresented or disadvantaged groups are not present to the same degree in these premier state institutions. In a state such as Florida, with an increasingly larger minority population and students from lower socioeconomic backgrounds, there should be an emphasis on ensuring these groups also have access to higher education institutions focused on high levels of research and provided maximal opportunities in STEM education.

In Texas, the results similarly suggested that very high research activity and higher concentrations of STEM field majors related to higher, though non-statistically significant, levels of state appropriations. Although student enrollment and entering SAT score were not positively related as in Florida. Again, as with Florida, Table 9 indicated a comparison of the institutions of Texas A&M University, the University of Texas, and the University of Houston that are both very high research with higher level of STEM field majors with the other institutions levels of state appropriations.

Institutions	State Appropriations per FTE	% VH-R*	% STEM*	% Minority	% Pell Grant*
TAMU/UT/UH	\$9,229	100%	23.6%	38.7%	16.8%
Remaining Texas Institutions	\$8,365	0%	10.7%	44.1%	31.3%
*Significantly different at the 0.05 level (2-tailed t-test)					

Table 9. Texas: Analysis of Institutional Characteristics

As the case with Florida, a funding model where institutions that are more focused on very high research and STEM fields having higher levels of appropriations could again be based on sound and rational educational policy. However, the data for Texas between these groups of institutions does not indicate a statistically significant difference in the percentage of minority students enrolled as it did in Florida. Although, the data did indicate a significant negative relationship between appropriations per FTE and the percentage of minority students over time. Additionally, the data indicated that students from lower socioeconomic groups are not present to the same degree in these premier state institutions to a statistically significant degree. Thus, even though it may be a legitimate rationale that these premier state institutions have a stronger focus on these areas; in Texas as in Florida, with an increasingly larger minority population and students from lower socioeconomic backgrounds, there should be an emphasis on ensuring these groups also have access to higher education institutions focused on high levels of research and provided maximal opportunities in STEM education.

### *Institutional Characteristics as a Predictive Model for State Funding*

Overall, Tables 5 and 7 demonstrated the best fitting regression predictive model for state appropriations based on the selected institutional characteristics. The results indicated that several of the institutional characteristics contribute significantly to the predictive nature of state appropriations per FTE student. In Florida, the regression model explained 63 percent of the variance in state appropriations per FTE and consisted of seven variables; the percentage of minority students, percentage of Pell grant recipients, very high research activity, institutional setting, overall student enrollment, and time in academic years.

The percentage of STEM field majors explained 28 percent of the model. Student enrollment was also a strong positive predictor. In this model, each additional student enrolled may lead to a \$0.19 increase in state appropriations per FTE. In other terms, every additional 1,000 students enrolled may lead to a \$190 per FTE increase in state appropriations, all else being constant. The impact of enrollment on appropriations would be expected considering that Florida uses a base plus method of higher education funding. The base plus method, also referred to as incremental funding, is the most commonly used funding method in higher education (Hummell, 2012; Sexton, Comunale & Gara, 2012; Zierdt, 2009). The base plus method uses the prior budget allocation as the reference point upon which to make determinations on the new budget allocations. Adjustments are then made for estimated changes in revenues and expenditures, most significantly changes in enrollment and cost of living (Sexton et al, 2012).

The percentage of minority student enrollment was the strongest negative predictor in the model, which explained nine percent of the variance. In this model, each additional percentage of minority student enrollment resulted in a decrease of \$86 in state appropriations per FTE student. Jones (2003) stated that the base plus method is viewed as a method that preserves funding at the status quo, which can vary as a positive or negative aspect depending on the perspective of an institution. As Florida's higher education funding model has a basis in prior times of segregation and other discriminatory practices against minority institutions, the base plus method could possibly be serving as hindrance to some institutions. The institutions with the larger minority enrollment tend to also have smaller overall student enrollments and typically increases in overall enrollment are the primary driver for base funding allocation (Jones, 2003).

In Texas, the regression model explained 30 percent of the variance in state appropriations per FTE. The model consisted of variables; entering SAT Score, student enrollment, the classification as a Very High, High Research, or Research institution, and time in academic years. The level of research activity explained a significant portion of the variance. The designation as a Very High Research Institution explained 13 percent. The impact of research activity on increased state appropriations is aligned with the principle that the formula funding method of allocation accounts for such factors as the difference in enrollment/FTE between disciplines and course levels, as well as buildings and classroom space utilized (Jones, 2003). This funding method is designed to utilize a defined standard of resource allocation as a means of equitable

distribution and meeting the needs of the institutions (Parmley et al, 2009). Thus, it would reason that institutions involved in higher research activity and would have more programs or courses, particularly at the graduate levels, funded at higher levels. Also, time in academic years also explained five percent of the variance as each academic year may lead to a decrease in state appropriations per FTE by \$89.

A significant portion of Texas's formula funding model is calculated outside of the core Instruction and Operations Formula, which may have factored into this regression model only being able to explain 30 percent of the variance in state appropriations. Approximately 17 percent of formula funding is based on a separate Infrastructure Formula which is calculated from utility rates and square footage to fund infrastructure costs such as the physical plant, maintenance, as well as project the amount of space an institution will need based on its programs, faculty, and students (Legislative Budget Board, 2011). Additionally, the formula funding model has annual "Small Institutional Supplements" of \$750,000 for institutions with less than 5,000 students and potentially phased up to \$750,000 for institutions with enrollments between 5,000 -10,000 students (Legislative Budget Board, 2011). There are also several non-formula funding items that are part of the state appropriations. Inclusions like special legislative items, capital funds, and significant constitutional funds such as the Permanent University Fund, may have impacted the predictability of the regression model for Texas higher education institutions.

### Implications of the Findings

The results of this study indicated that the overall equity of higher education appropriations to state institutions in Florida and Texas had improved during the 15 years subsequent to the Office for Civil Rights regulatory requirements stemming from *U.S. v. Fordice*. Additionally, the data demonstrates there are definite state priorities present within the respective funding models that may influence the level of state appropriations distributed to individual institutions. In both Florida and Texas, funding models favored the premier research institutions within the state. Coupled with enrollment, as certain institutions academic characteristics increased, so did their appropriations per FTE.

An implication of this study is that institutions that wish to increase their level of appropriations per FTE should prioritize their commitment to higher academic quality indicators such as academic selectivity, focus on STEM fields and production of research. This perspective joins Coughlin and Erekson (1986) and Bradford (2008), that states have a desire to fund institutions that promote what is considered to be academic quality and excellence in the eyes of the public. Leslie and Ramey (1988) even suggest that in rational economics, the state as with most organizations, will want to continue to support institutions that are doing well and having such a positive visibility is important to increasing funding.

Both Florida and Texas funding models emphasized their institutions' focus on research and STEM fields through increased state appropriations. Currently, there are definite concerns that our state higher education institutions are not adequately



producing and preparing a sufficient number of students and practitioners in the STEM areas (Kuenzi, 2006). The National Math and Science Initiative (2013) report that economic data indicate that approximately one million additional STEM graduates will be needed over the next decade to fill America's economic demand and that STEM-based employment needs are estimated to increase 17 percent over the next ten years. Thus, this support of STEM and research could be viewed as legitimate educational policy and serving the needs of the states, as we are in times of increased needs to produce more graduates to contribute to the STEM related workforce.

However, when analyzing the demographics that comprised the student population of these institutions that most highly represented these indicators of academic quality, another implication of this study was that the students from socioeconomically disadvantaged and minority groups were underrepresented at these institutions. Key goals for higher education are access, diversity, and quality (Coughlin and Erekson, 1986). Thus, there are competing interests present at both the state and institutional perspectives, in having funding models that reward academic quality and interests, but at the same time addressing the lack of access and diversity to these quality institutions.

Again, the disproportional representation of minority groups with access to the highest academic institutions is a significant concern in Florida and Texas as these two states have increasingly larger minority populations. With respect to STEM fields, these states may not have the necessary practitioners who are responsive to the demographics of the state (Jones, 2013). Further, this trend is not in the state's best interest from an economical perspective, as greater numbers of non-residents will need to be employed in

these areas rather than the residents upon which the state's financial resources were used (Jones, 2013).

Additionally, Astin and Oseguera (2004) suggest that highly ranked institutions tend to have substantially more resources than other institutions and an analysis of the data in this study indicated that assertion to be true in Florida and Texas. However, as institutions aim to achieve higher levels of academic quality, they subsequently need to address any overemphasis on standardized test scores and consideration of additional selection criteria for admissions. Research has demonstrated that lower socioeconomic and minorities tend to perform lower on such test than higher income and/or White students (Bradford, 2008). Thus, higher education institutions may be limiting acceptance to otherwise qualified students represented in those disadvantaged groups.

Higher education institutions could examine their admissions processes and establish or increase opportunities for incorporation of holistic reviews as a means to addressing this issue. A holistic review of applicants allows an opportunity for a more level playing field, as it expands the possible criteria and measures used in selection (Bradford, 2008). As of to date, the U.S. Supreme Court has not changed their opinion given in *Grutter v. Bollinger* (539 U.S. 306, 2003). The Court held that institutions could take an applicant's race into account as one of many criteria in a holistic review process as necessary to achieve the educational benefits and goals related to diversity (Glicksman, 2013). Astin and Oseguera (2004) also note that students from lower income households and underrepresented minority groups tend to make up significant portions of those affected the most by the measures and criteria used an institution's

selectivity, and the data certainly indicated that is the situation in Florida and Texas.

This study further demonstrates the need for higher education institutions across the state to have equitable resources to meet the needs of all groups of students.

#### Recommendations for Future Research

This study analyzed the equity of state support of public higher education in Florida and Texas since the OCR mandate to remedy past inequities in funding, and it has generated questions for future research. Because research on the equity of state funding to public higher education institutions remains limited in general, further studies pertinent to this issue are warranted. First, it is recommended that replications of this study be done continuing the equity analysis of state appropriations since 2007, where this study ceased, to the present date to further examine these institutions. Also, expand the study to include other states affected by the Office for Civil Rights' mandate to remedy past fiscal inequities and compare the results of other state institutions to the data in Florida and Texas, to further identify common trends and provide a greater depth to the findings.

In addition, it is recommended that researchers employ qualitative methods of analysis to understand and gain further knowledge into the history, purpose, and factors involved in each state's choice in the funding models used in the allocation of resources to higher education. This information would be especially beneficial in states, such as Texas, that utilize formula funding. More insight into the rationale of the state legislators and stakeholders of public education may help to understand why some

inequalities exist and how policymakers and institutional leadership may best address them with these issues and rationales in mind.

Future research should also continue to address the impact of other funding sources external to state appropriations, such as endowments, fundraising, and grants, impact resource equity within the state and on institutions' ability to successfully carry out their educational missions. Particularly, during times when state budgets are overwhelmingly stressed for resources, this research would help examine the impact of external funding. Along with understanding the impact, this research would be useful in the possibility to also provide information to higher education institutions on methods to increase these alternative sources of funding revenue.

Finally, future research should help educational leaders and policymakers address the conflict this study has indicated in the competing values of access, diversity and academic quality as it relates to state funding. As states continue to become more ethnically and socioeconomically diverse, more attention will need to be focused on increasing access and providing the opportunities for all students to receive higher education at institutions of high academic quality. States will need to ensure that they are producing a diverse educated populace equipped to handle the changing environment and providing higher education institutions the necessary resources to do so.

### Final Thoughts

This study demonstrates that Florida and Texas have made significant strides in increasing the equity of state appropriations in their state systems of higher education. Even if all funding is not equal, the data indicates equitable funding processes

comprising legitimate educational rationale in which state appropriations are distributed. However, even though greater parity between educational institutions may be present, the core of the issue involved the equitable access to academic quality for all students within the state as well, and more progress stills need to be made in that regards.

The study also recognizes that higher education funding is a very complex issue involving numerous factors that contributed to the allocation of resources (Layzell and Lyddon, 1990; Bradford, 2008). Depending on the state, the variables used in the study can explain between approximately 30 to 60 percent of the variance in state appropriation per FTE. This is very beneficial information that in some circumstances, over half of the variance in state appropriation funding can be accounted for. However, this also demonstrates the need for caution in the interpretation of the results because a significant number of determinants have not yet been identified. Other research has found that factors related to tax revenue, state median income, state governance and the influence of politics and lobbying, to name a few, can also significantly affect state appropriations and its subsequent distribution (Toutkoushian and Hollis, 1998; Tandberg, 2008).

In conclusion, this study is but one more addition into the existing body of knowledge into higher education funding and the determinants of state appropriation. This study has provided useful information that further researchers can use to examine such a significant topic in further detail. Florida and Texas have made progress in increasing fiscal equity in their state systems of higher education since the implications of *US v. Fordice*, but this effort should not be seen as a one time achievement target.

Providing a quality education to all students in the state, in part through an equitable process of resource allocation, is an ongoing goal the state, its higher education institutions, educational leaders and policymakers should constantly seek to improve.

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